

# Stargazers' Anonymous

An examination of amateur astronomy in New Zealand



A thesis submitted to Victoria University of Wellington to satisfy the requirements for a Masters (MA) in Anthropology, 2009

*by*

**Brian Howe**

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## **Abstract**

In this examination of amateur astronomy in New Zealand, I suggest that astronomical science can be a medium through which adherents attempt to enact social transformation. Contemporary studies of leisure often emphasise the individualistic nature of leisure activity, with social interaction framed as a means to support the intrinsic and extrinsic motivations of participants. However, while amateur astronomers do engage in ‘serious leisure’ (Stebbins, 1979, 1992), I suggest their extended roles as educators and liaisons for professional counterparts push their endeavour beyond mere participation and into wider territories of public engagement and scientific discourse.

Following analysis by Ruonavaara (1997), Rojek (1985, 2000), MacCannell (1976), Urry (1990) and Turner (1969), I argue that the New Zealand astronomical community’s proclivity for education operates as a forum for constructing recursive and normative action, in which ideologies congruent with scientific rationalism are disseminated through a form of moral regulation.

Commencing with a discussion of the structure of New Zealand’s astronomical community, I examine how informants’ narratives and attitudes to contributive participation manifest in demonstrative actions that provide idealised templates for behaviour. Secondly, I discuss astronomy and public education, and how astronomical society volunteers utilise visitors’ expectations of authenticity and perceptions of nature to formulate strategies for social change. Finally, I investigate the role and purpose of other astronomy-related ventures, including Carterton’s Stonehenge Aotearoa, culminating in a discussion concerning issues of knowledge, science and postmodernist deconstructionism.

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Astronomy compels the soul to look upwards and leads us from this world to another.

- Plato, *The Republic*

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## 1 Introduction

Prior to committing to this study, my experiences with astronomy were fairly limited. Aside from a view of Halley's Comet in 1986 as an inquisitive nine-year old, a membership to the Wellington Astronomical Society in 2005 (dutifully renewed immediately prior to fieldwork in March 2007) and a sizable back catalogue of *New Scientist* magazines, I had never really 'engaged' with the solar system, variable stars, gamma-ray bursts, black holes, quantum physics or the ever-elusive 'dark' matter in any meaningful way.

Despite my lapsed membership at the Wellington Astronomical Society I was still subscribed to the society e-mail list, and throughout 2006 and early 2007 was receiving the bi-weekly (or occasionally, thrice-or-more weekly depending on the level of activity) announcements and news concerning the various issues, notices, future events and observing sessions that the local committee had planned for members. Having made the decision to pursue a Master's degree, and evaluating and discarding a number of other potential avenues of investigation, an email from the *WAS-Announce* bulletin detailing an upcoming public education night piqued my interest. I knew from personal experience and observation that astronomy is scientific and involves a lot of 'technical know-how'. To many, it serves as a form of leisure activity that can be either intensely personal and individual or group-based and socially enjoyable. But all things considered, it hardly has 'mass-appeal' as a recreational activity compared to rugby, video games or watching television. I also reasoned that those who display a genuine interest will usually seek out and find the local society and become involved, as I did in 2005. Furthermore, considering the relatively large numbers of backyard astronomers in New Zealand, membership in the local societies did not seem prone to folding due to a lack of interest. So why go to the trouble trying to educate the general public? This trivial question was nevertheless a sufficient source of motivation for me to formulate a basic proposal and (with a degree of trepidation) engage in approximately eight months of interviews and participant observation around various homes and observatories around New Zealand. The results - and a great deal of analysis and interpretation - are contained in this thesis.

### *1.1 Amateur astronomy as a research topic*

Astronomy, and those who devote time and money to pursuing it, provides a particularly interesting topic for a number of reasons. While serving in one capacity as an activity undertaken by individuals for personal enjoyment, it also provides a means for participants to engage with a highly complex and hierarchically-structured network of social relationships which in turn enables those involved at a 'backyard' level to make tangible contributions to science and advance the proliferation of specialised branches of knowledge.

Bolstered in part by the strong media presence of international agencies and projects such as NASA (National Aeronautics and Space Administration) and the Hubble Space Telescope (HST), New Zealand's astronomy enthusiasts have been instrumental in making observational science accessible to members of the public for decades, through the organisation of public viewing nights held in observatories and rural locations throughout the country. As one group 'provides' information and another 'consumes' it, the method of communication in astro-education also provides an interesting forum for debate concerning broader concepts of knowledge production, and the role of participants at a local level in disseminating personal and group ideologies concerning science, empiricism and objective truth.

In short, as an amateur 'hobby' conducted by adherents to the observational sciences, an anthropological and sociological study of astronomers in New Zealand provides an opportunity to examine a rich variety of concepts and themes: social interaction within a specialised framework of ideas and practices, leisure and society, attitudes to consumption and production, identity, subjectivity, public education, science, tourism, the control and pursuit of 'knowledge' and, as discussed later in this paper, environmentalism and politics.

## ***1.2 Some considerations in undertaking research***

Publications and information pertaining to astronomy are vast, and range from the freely obtainable (popular internet sites<sup>1</sup> and library books, or internet 'freeware' programs<sup>2</sup>) to subscription-only publications (magazines such as *Sky and Telescope*, *Astronomy*<sup>3</sup>, member-only society newsletters or commercial software) or esoteric, academic publications and journals written for a select audience. The majority of these publications deal with what may be construed as the 'normal' facets of day-to-day (or more aptly 'night-to-night') astronomical observing and cosmology, such as technical and scientific information, current astronomy projects, equipment and telescopes, charts of star positions or discussions of recent developments involving astronomical discoveries as presented in the media.<sup>4</sup>

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<sup>1</sup> Some of the most popular astronomy websites currently available on the internet (based on Google™ page rankings and the frequency with which they appear on various 'links' pages and redirects from other websites) include: "Astronomy Picture of the Day": <http://antwrp.gsfc.nasa.gov/apod/>; "Universe Today": <http://www.universetoday.com/>; NASA's website for the Hubble Telescope: <http://hubblesite.org/>; NASA's NSSDC (National Space Science Data Centre): [http://nssdc.gsfc.nasa.gov/nssdc/gen\\_public.html](http://nssdc.gsfc.nasa.gov/nssdc/gen_public.html); "SETI (Search for Extraterrestrial Intelligence)": <http://www.seti-inst.edu/>; "SPACE": <http://www.space.com>

<sup>2</sup> Examples include: "Celestia 3-D": <http://www.shatters.net/celestia/index.html>; Microsoft's 'Worldwide Telescope': <http://www.worldwidetelescope.org/>; "Stellarium" (Virtual Planetarium): <http://www.stellarium.org/>; "Deepsky 2000": <http://www.deepsky2000.net/>; "Starry Night": <http://www.starrynightstore.com/>

<sup>3</sup> *Sky and Telescope*: <http://www.skyandtelescope.com/>; *Astronomy Magazine*: <http://www.astronomy.com/asy/default.aspx>

<sup>4</sup> A select few invoke an anthropological and historical approach to understanding ancient or pre-colonial astronomy, such as Anthony F. Aveni's seminal work on archaeoastronomy, "Skywatchers of Ancient Mexico" (1980, revised edition 2001; University of Texas Press (United States); ISBN: 978-0-292-70502-9) or Jarita C. Holbrook's "African Cultural Astronomy: Archaeoastronomy and Ethnoastronomy Research in Africa" (2008; Springer Publishing (United States); ISBN-10: 1402066384) which examines a range of African myths and legends about the sky, alignments to celestial bodies found at archaeological sites and places of worship and includes a study of rock art with celestial imagery. Additionally, examinations and discussions of the contemporary astronomical community have begun to surface in recent years; for example Andre Heck's edited collection of papers on the burgeoning field of 'socio-astronomy', the aptly titled "Organisations and Strategies in Astronomy" (2000), and Julio Iglesias de Ussel (et al)'s brief article "Sociological Profile of Astronomers in Spain" (1997, 2004, 2006; *Astrophysics and Space Science*; Vol 257, No.2, April, 1997), though it should be noted that the

In relation to the type of study presented in this thesis, perhaps the most relevant publication is Robert Stebbins' ethnographic account of North American astronomers, "Amateur and Professional Astronomers: A Study of their Interrelationships" (*Journal of Contemporary Ethnography [Urban Life]*; 1982; Vol. 10, No.4; pp. 433-454). While Stebbins' brief paper on this subject has some minor parallels with my own research, his quantitative approach is regrettably devoid of any social context and makes many appeals to psychologism, especially in categorising the intrinsic motivations of informants as distinct behavioural 'types' apt to behave in ways congruent with stereotypes of the socially inept and career-focused grey-haired scientist. Nonetheless, Stebbins' pioneering work on the ways in which hobbyists, amateurs and the general public interact with each other and their professional counterparts (an aspect of his research referred to later in this paper) is extremely well-articulated, and transfers well to any analysis of the numerous issues and social context these often complex relationships entail.

## 2 Methodology and Research

### 2.1 Interviews

From March to December 2007, I conducted 19 scheduled interviews<sup>5</sup> with respondents and informants<sup>6</sup> around New Zealand, including Dunedin, Christchurch, Nelson, Wellington, Carterton, Hawera, New Plymouth, Gisborne, Auckland and Dargaville. All (save for one) had some kind of university qualification. Approximately two-thirds of informants were between 40 to 50 years of age, and were either married, or had been married or in a long term relationship within the last ten years. There were a range of occupations – from schoolteachers, to mail sorters, ex-professional astronomers, and engineers. The remaining third of informants constituted people at either end of the spectrum, who were either younger (between 30 years) or older (70 years plus, retired).

The interviews undertaken were unstructured and involved discussions based on a list of questions comprising various areas of interest. While this approach is distinguished from more 'structured' methods of interviewing (which may comprise for example, a set of specific instructions or the gauging responses to identical stimuli across a range of participants) as noted by authors such as Bernard (1995:209), the flexibility inherent in the interview process does not necessitate it being 'casual' or even relaxed. As both parties recognise the purpose of the interview – to glean information specific and relevant to the study –

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focus of both publications leans more toward a quantitative examination of astronomical magazine readership, job prospects for aspiring professionals and the workflows and dynamics involved in collaborative projects.

<sup>5</sup> 'Scheduled' interviews denote those recorded with a digital recording device either at the informant's home or a nominated location and lasting approximately an hour in length. Other verbatim accounts – such as conversations with astronomical society members at meetings – were also utilised as ethnographic material, though these were recorded separately in scratch notes or recalled in later analysis as commentaries to accompany transcripts.

<sup>6</sup> Though there is usually a clear distinction made between 'informant' (someone with whom the researcher interacts on a repeated basis during the course of fieldwork and interviewing) and *respondents* (those participants interviewed for one time only, and who are likely never to be seen again), I will use the term 'informant' for the sake of consistency.

there is a constant and conscious monitoring from both sides as to what information is useful, what tangents should be pursued and what areas of inquiry are taboo or likely to cause embarrassment.

As the start of the interview invariably coincided with the pressing of the record button on my recording device, any prior discussion was deemed 'pre-interview', and consisted in the main of informal conversations regarding the weather, the maintenance of homes or observatories and the amount of time interviewees had lived in the area. The 'interview proper' consisted of approximately ten questions, ranging from the straightforward ('How did you get into astronomy?') to those that required more thought ('What is your opinion of the current state of astronomy-related education in New Zealand?'). In keeping with the unstructured format, subtle prods for elaboration generally led to a myriad of tangents which upon later analysis, provided a wealth of possible angles to explore. Likewise, post-interview discussions often yielded some of the most interesting and stimulating material, and after the fourth or fifth interview I got into the habit of leaving my (thankfully unobtrusive) digital notetaking device on 'record' to capture the many insights offered by my informants. These commonly took the form of "oh by the way, I forgot to mention..." moments, in which earlier topics had stimulated additional reflection or analysis of their activities.

Having taken a postgraduate course in ethnographic research prior to conducting fieldwork for this paper, I had been fortunate enough to experience first-hand some of the potential pitfalls associated with underestimating the balance of authority and mutual trust that permeates the interview process. To this end, my (oft) repeated assurances of anonymity and my 'idealistically objective' status as a social science researcher prior to launching the interview proper was partially due to anticipating my informants' lack of knowledge regarding what an anthropologist actually *does*. While adhering to standardised procedures of my own - such as reading aloud through the information sheet or ethical guidelines I had provided to informants to alleviate concerns and explaining the security measures taken for all types of data - past experience had taught me that conducting interviews under the banner of 'anthropological research' was immediately rendered trivial if informants didn't comprehend what 'anthropology' actually *is*.<sup>7 8</sup>

Additionally, the majority of my informants were scientifically educated, and as such were adherents to a mode of thought and perception based on empirical fact and observation. As a researcher working in a discipline that has, by and large, embraced interpretive analysis, engaging in discussions regarding the theoretical underpinnings of the research in a manner that could be clearly understood was often challenging, and attempts to explain "what the thesis is about" had to be carefully phrased to clearly convey my own knowledge or experience on the subject (Soyini, 2005:31). To this end - and coupled with

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<sup>7</sup> And I was acutely aware that in this situation, informants frustrated by a lack of understanding can simply exercise power by providing guarded or incomplete information (Bernard, 1995:210, 220; Soyini, 2005:33, 111).

<sup>8</sup> This point seemed especially relevant to my attempted use of questionnaires. Without the benefit of face-to-face contact and an explanation of the theory behind the research process, it was inevitable that potential respondents may have been reluctant to provide information given their relative lack of experience with the social sciences or anthropology in particular. As such, only two of approximately 30 questionnaires sent out were returned, making them an ineffectual research tool.

assurances of my interest in *their* thoughts and experiences - I was fortunate most of the time to be able to attain a relaxed environment in which to conduct an interview based on what Bernard (1995:150,211) describes as “mutual respect and a degree of trust and understanding”.<sup>9 10</sup>

## 2.2 Participant Observation

Ethnography is the study of people in naturally occurring settings or ‘fields’ by methods of data collection which capture their social meanings and ordinary activities, involving the researcher participating directly in the setting, if not also the activities, in order to collect data in a systematic manner but without meaning being imposed on them externally. (Brewer, 2000:6)

My participant observation<sup>11</sup> often occurred in tandem with interviews, and whenever possible would be tied in with attendance at the informant’s local society meeting<sup>12</sup>. This provided the opportunity to observe social interaction between my informants and other members during presentations and post-meeting discussions, in addition to meeting other potential informants. When timing, finances and accommodation permitted, I would attend either informal observing nights – small groups of amateurs with telescopes going out to view the night sky – or ‘star parties’, which were customarily scheduled in advance by the local astronomical society and consisting of larger groups venturing to a rural location or a local observatory. On other occasions, I played the dual role of tourist and researcher – purchasing a ticket, or

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<sup>9</sup> Interviews were transcribed on the same night or first thing in the morning, which allowed for a quick review and additional notes to be made on factors such as environment, informants’ apparent state of mind – for example, if they were significantly tired or distracted – and potential biases or judgments made during informal discussions before and after the scheduled interview.

<sup>10</sup> Additionally, *phased assertion* – the appearance of knowing more than I really knew – often prompted informants to ‘open up’ on particular topics that may have otherwise been closed to me due to their technical complexity or political overtones, enabling us to navigate around instances of self-presentation and organisational rhetoric to ‘get to the root’ of specific attitudes or actions (Bernard, 1995:219; Soyini, 2005:35). ‘Political overtones’ in this respect can refer to internal politics within organised groups, disagreements or personality conflicts with other members and personal reflections on specific events or circumstances. As a means to provide a gateway to further areas of interest during the interview process, these have to be negotiated carefully as to avoid any emotional distress or regret – that they may “have said too much” - at the conclusion of the interview. (Bernard, 1995:220)

<sup>11</sup> Two issues were immediately apparent in conducting participant observation: for one, astronomical observing requires a ‘dark site’ to allow the eyes to adjust in order to maximise the use of telescopic optics; using a flashlight or any other white light source to illuminate note-taking was prohibited. Second, society meetings or social gatherings prior to night-time observing were usually conducted in claustrophobic conditions, where the conspicuous jotting of notes only served to highlight to those being studied that despite my participation and status as an ‘interested astronomer’ I had a radically different agenda. In this sense, I was attempting to convey the appearance of simply “hanging out”, with the aim of observing *ordinary* conversation and *ordinary* behaviours – minimising the ‘otherness’ of me - the ‘ethnographer’ - as much as possible. (Bernard, 1995:152) In both cases, suspending my concern with producing extensive written accounts and excusing myself to write quick, shielded scratch notes, ensured that I could still write contemporaneously with events and experiences without interfering with the fieldwork itself (Emerson et al, 2001:353, 355, 357; Lofland & Lofland, 1995:90; Bernard, 1995:191). Circumstances that were contrary to permitting note-taking at all – rapid-fire conversations in the midst of night-time observing, or being ‘fully engaged’ with a telescope – demanded simply watching, listening and remembering. Despite the potential for losing valuable material, recalling these ‘mental notes’ allowed for a total immersion in my informants’ activities and a reduction in my own anxieties at being unable to record everything that transpired (Tierney, 2002:12; Lofland & Lofland, 1995:90; Emerson et al, 2001:356).

<sup>12</sup> As the most ‘accessible’ environment for observation (given that they permit, with one or two exceptions, any interested non-member to attend), society meetings were for me the ‘bread and butter’ of fieldwork. They enabled me to participate in ‘shared learning’ with other interested people whilst gaining the benefit of others’ experiences of the actions involved in maintaining the running of the group.

providing a donation at an ‘astro-tourism’ site or observatory in exchange for a demonstration of equipment and explanation of the standardised narratives given to tourists both local and international.

### 2.3 *Some reflections on the fieldwork process*

Can the synthetic totality constructed by an ethnographer as a result of fieldwork be anything other than an *ad hoc* interpretive model of the society studied?

(Descola, 1992:107)

Given my decision to undertake research in various sites around New Zealand, as opposed to focusing on one specific region or city, it was somewhat inevitable that the fragmented nature of my informants’ locations would become problematic when it came time to present an analysis of the fieldwork material. ‘The Skywatchers’, ‘The Stargazers’ or ‘The Amateur Astronomers’ – to use phraseologies consistent with studies that bind people to place – are not enclosed within a geographically specific locality, nor are they a centralised population from which one can glean historically specific details or precise political and economic rationales for behaviour. Instead, the subjects of this study *are unified only by a common pursuit or ideology* - comprised of specialisations, niches and principles immersed in dense social networks which are themselves based on idiosyncratic experiences accessible only through the voice of those whom I have spoken to directly. While interviews may “allow us to extend our ethnographic reach in time and space, to learn about events we cannot observe and...to achieve illumination of larger issues that originate in fieldwork observations” (Sanjek, 2000:282), the unavoidable tendency of informants to present the ‘culture’ of New Zealand astronomy in a holistic manner meant that great care had to be taken to avoid instances of faulty generalisation or appeals to a unified ‘New Zealandness’ of the amateur astronomical experience. Given the mobility of participants (enabled by New Zealand’s relatively small geographical landscape) and the prevalence of internet-based social interaction between individuals and groups, the sum of informants’ personal experiences - a regular presence at the annual ‘Stardate’ event in the Hawkes Bay, informal observing nights with select groups, or attendance at neighbouring astronomical society meetings - would often manifest in what Descola (1992) describes as a haphazard combination of “partial points of view and elicited intuitions, scraps of knowledge and appeals to tradition” that coalesce as “something approximating [the] global image mirrored by the monograph.” (1992:107)<sup>13</sup> On this topic especially, Sanjek (2000:285) notes that ethnographers “come to fieldwork with a set of significant theories...[that] play a strong part in moulding what we hear and observe in events, in shaping the ‘there’ we find there.” But that we are also confronted by “the ongoing events and commentary of our informants that lead to terrain-specific theories of significance, which then also mould what we hear and observe.”<sup>14</sup>

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<sup>13</sup> Additionally, Sanjek (2000:282) notes that “human beings are apt to reinterpret or reformulate the past to make it conform with their ongoing sense of the present”, a tendency occasionally demonstrated by some informants apt to forcing memories of ‘the good old days’ into contemporary observations, or who may have presented idealised versions of prior events measured against modern standards of behaviour or socio-political determinants.

<sup>14</sup> On this note, I ensured that interviews were analysed post-transcription for common phrases or terms that were constant across all interview participants, particularly noting and cataloguing ‘common knowledge’ generalisations (in relation to

## 2.4 Method and Theory

It has been suggested by various authors over the years that the social sciences ‘long to belong to the school of positivism or empiricism’ rather than be associated with the pure subjectivism (and be subject to the criticism of unreliable measurement or predictability that qualitative analysis implies) (Holbrook, 2008; Emerson et al, 2001; see also Bernard (1995:15-16) for his brief discussion of Paul Radin’s (1966[1933] attack on Boas, Sapir, Kroeber and Mead’s attempts to instil a ‘probability factor’ or “quantitative correction” to studies in ethnology). While some disciplines have adopted an ever-increasing focus on the quantitative facets of scientific method for their epistemological investigation (as in for example, economics or psychology) social and cultural anthropology in the latter half of the twentieth century (and into the twenty-first) has been somewhat tenacious in choosing to retain interviews and participant observation as sources of primary data, countering the empirically-driven and statistics-based causal analysis of societal trends that arguably generate an inadequate correlation between ‘quantification’ and ‘reality’. To this effect, contemporary anthropological and sociological methodologies have gravitated toward an approach based on a synthesis of quantitative and qualitative techniques that aim to capture the multidimensional and dynamic nature of culture and social interaction whilst recognising trends associated with a variety of quantifiable factors (Bernard, 1995; Brewer, 2000; Rojek, 2000; *see also* Roberts, 2006).

With respect to the above, my own methodological approach is, for all intents and purposes, exclusively qualitative given the negligible amount of quantitative analysis required.<sup>15</sup> With this focus in mind, my interpretive framework can be construed as an amalgam of qualitative approaches that draw on both the ‘phenomenology of everyday experience’ (Shutz, 1972, *cited in* Kelly and Godbey, 1992:203) with additional elements of ‘existential sociology’ (Douglas and Johnson, 1977). The former has its origins in earlier European philosophical traditions and Merleau-Ponty’s (1945, 1955, 1964) epistemological examination of human perception, concerning the ways in which social actors attempt to make sense of the world through the use of (generally) symbolic attachments to create ‘structure’. The sharing of these symbols between actors in the social world allows for both regularity in social interaction and a shared consensus on ‘what exists’, manifesting as the ‘hidden rules’ of social conduct. However, as with the (latter) existential approach, it should be noted that the construction of these regularities are fashioned through conscious decision and action as opposed to purely determinative factors. Rather than seeing

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repeated, observable behaviours) and ‘idealised truths’ that represent subjective opinions based on limited experience. While all interviews were conducted privately at informants’ homes, observatories or meeting halls, an informant’s own paraphernalia – books, posters, photographs or equipment – served to saturate the immediate environment with material reminders of the subject’s self-image; a persona that is dependant on continual reaffirmation in relation to others in a specific social network. In this respect, the potential existed for informants to idealise or embellish specific ideological perspectives with regard to activities, people or ideas; in effect, defending one’s self-image via an idealised notion of ‘common harmony’ within the group (Soyini, 2005: 33, 34; Werner and Schoepfle, 1987:316).

<sup>15</sup> Some minor statistics of relevance however - the number of astronomical societies in New Zealand, or the prevalence of commercial tourist locations for instance – are occasionally called upon in discussions detailing the overall scope of the organisational and social contexts in which my informants operate.

human action as a mere ‘product’ of social forces, it is recognised that the social environment is not “just structure” but is produced (and reproduced) in the dialectic in which actors ‘acts’ and are ‘acted upon’. In this sense, both approaches allow for the possibility of participants to make intentioned decisions for committing to concrete actions in daily life in which many elements are not repeatable; for example, feelings, emotions and “actual situated experience” rather than abstract principles (Kelly and Godbey, 1992:202, 203). Therefore, it is left to the researcher to provide an ideally reflexive interpretation of the qualitative data obtained and situate it within a context accessible to the reader.

However, this also brings me to another point: this paper is not in any sense a ‘value-free’ ethnography. By providing verbatim accounts of my informants’ thoughts and observations, I hope to convey at least *some* semblance of the informants’ voice in the text. However, I also concede that these voices will ultimately be filtered through my own narratives and contextualised within my own interpretive framework.<sup>16</sup>

### 3 Astronomy, Amateurs and ‘Leisure’: three concepts

In order to give context to the chapters that follow, it is first necessary to briefly discuss just what exactly ‘astronomy’, ‘amateurs’ and ‘leisure’ mean to those under study - as well as those *doing* the studying. While all three carry methodological significance for my own research (in that all three concepts are entrenched within the actions, opinions and interpretations under examination) the first - ‘astronomy’ - carries the most weight for my informants and their associates, as it is largely *they* who determine and define - within acceptable limits - how the term is employed, and what significance is attached to its usage in the social worlds they inhabit.

#### 3.1 Astronomy as both definition and action

**astronomy** /ə'strɒnəmi/ *n.* the scientific study of celestial objects, of space, and of the physical universe as a whole. □ **astronomer** *n.* [Middle English via Old French *astronomie* and Latin from Greek *astronomia*, from *astronomos* (adj.) ‘star arranging’, from *astron* ‘star’, *nemō* ‘arrange’]<sup>17</sup>

A haphazard search for “what is astronomy?” on the popular search engine *Google*<sup>18</sup> yields some 4,290,000 results<sup>19</sup> at the time of writing. Indiscriminate samples of website definitions range from “the

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<sup>16</sup> On this point especially, Laine (1997:111) notes that “the [ethnographic] process is marked by balanced arrangements established on trust and reciprocity but the end product portrays the reverse...Ethnographic writings provide a glimpse of the author’s privileged access to the character’s thoughts, feelings and motives, as well as their overt speech and action. With production of the text, the omniscient author chooses which members’ voices to present.”

<sup>17</sup> *The Concise Oxford Dictionary of Current English* (1995), Oxford University Press, New York, United States of America

<sup>18</sup> *Google* was selected as an example based on (a) perceived popularity, (b) *Google*’s in-text search algorithm and (c) reported usage statistics. For example, *Neilsen / Netratings, March 2003* suggests the total combined search hours for the *Google* search engine as being 18 million per month, or 112 million searches per day. Source: *1 Cog Web Design Website*; <http://www.1cog.com/search-engine-statistics.html>; accessed 28 October 2007



science of space beyond Earth's atmosphere"<sup>20</sup>, "the branch of physics that studies celestial bodies and the universe as a whole"<sup>21</sup> to "[t]he scientific study of the Universe and what it contains (planets, stars, galaxies, etc), and how these things formed and evolved over time. Not to be confused with astrology, which is a set of beliefs about the influence of heavenly bodies on human affairs. Astrology is not generally accepted to be a science."<sup>22</sup> A clear and comprehensive definition offered by the National Optical Astronomy Observatory (<http://www.noao.edu/>) states:

Astronomy is the study of the celestial bodies and their compositions, motions, and origins. Most astronomers concentrate on a particular question or area of astronomy, for example, planetary science, solar astronomy, the origin and evolution of stars, or the formation of galaxies. Observational astronomers design and carry out observing programs with a telescope or spacecraft to answer a question or test the predictions of theories. Theorists work with complex computer models of a star's interior, for example, to understand the physical processes responsible for the star's appearance.

Astronomy is different from most sciences in that we can't directly interact with the object of study. That is, it is impossible to dissect, weigh, touch, smell, or otherwise experiment with a star. For the most part, we learn about astronomical objects indirectly by observing the light they emit or reflect, and measuring the motions they and their celestial neighbours exhibit. Gains in astronomical knowledge are made through research, a systematic inquiry in which scientists define a question, gather relevant data, formulate a hypothesis, then test the predictions of that hypothesis.<sup>23 24</sup>

When asking my informants if they agreed with such technical definitions, the general consensus was that they were "true and correct" but required elaboration, particularly in the areas of history, context and personal experience. Michael<sup>25</sup> suggested that "you've got all that...astronomy covers all the sciences...you've got physics, geology, chemistry, biology, theoretical stuff...but it's also the history behind it too, all the astronomers who fought with the church over what they found...you've got ancient astronomy with the Inca's and the Greeks, and here in New Zealand the Maori, navigation...and a lot don't really think about [James] Cook and the reason he set out to get here in the first place, you know all that stuff..." Indeed, any discussion of astronomy with an experienced observer, or a visit to a commercial astro-tourist site, will inevitably invoke a recap of the historical events that led to New Zealand's formation

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<sup>19</sup> Other high-ranking website searches, for example *AllTheWeb.com*, yielded 72,700,000 results. Another popular search engine, *Yahoo.com*, yielded 78,700,000 results.

<sup>20</sup> *AstroLab Canada* Website, English Version: "What is Astronomy?"; <http://astro-canada.ca/en/a1102.html>; accessed 28 October 2007

<sup>21</sup> Princeton University WordNet Lexical Database for the English Language; Word Definition: "Astronomy"; <http://wordnet.princeton.edu/perl/webwn?s=astronomy>; accessed 28 October 2007

<sup>22</sup> Australia Telescope Outreach and Education Website: Astrophysics and Cosmic Engine Glossary; "Astronomy" [http://outreach.atnf.csiro.au/education/senior/astrophysics/astrophysics\\_glossary.html](http://outreach.atnf.csiro.au/education/senior/astrophysics/astrophysics_glossary.html); accessed 28 October 2007

<sup>23</sup> National Optical Astronomy Observatory (Tucson, Arizona, United States of America): FAQ Question: "What is Astronomy?" URL: <http://www.noao.edu/education/astfaq.html#ques1>; last accessed 31 October 2007

<sup>24</sup> Similarly, Gabler and Frank (2005:183) propose that "astronomy...[is] fundamentally premised upon the observation and classification of discrete, static fields of phenomena. [It] assume[s]...a "reality" that is structured around fixed categories and vertical hierarchies...astronomy is the very paradigm of the observational science. Although we have sent men to the moon and robots to Mars, for all practical purposes astronomical phenomena are completely removed from human contact – we can do no better to gaze at the stars and to map their movements."

<sup>25</sup> A pseudonym.

as a colony - including recognition of pre-colonial Maori mythology and seasonal harvest patterns (commonly known as *Matariki*, or the Pleiades Star Cluster) and the importance of astro-navigation in establishing some of the key facets of scientific measurement. This latter point is generally underscored in terms of importance as it makes a direct link between ‘The Past’, and contemporary New Zealand astronomy; consequently, it warrants a brief diversion, if only to understand how astronomy in New Zealand is contextualised by some of my informants.

It was under orders from the Royal Society of England that the initial expeditions of Captain James Cook and astronomer Charles Green took place in 1769, to observe the transit of Venus<sup>26</sup> from Tahiti. Subsequent observations of Mercury’s transit (from what is now known as Mercury Bay, Coromandel Peninsula) assisted in establishing and calibrating the Astronomical Unit (AU), or the distance from the Earth to the Sun. Further expeditions led to the mapping of New Zealand’s coastline by Cook and his crew in 1773-1774 and 1777, including stopovers in Fiordland and Queen Charlotte Sound to assist in astronomically determining latitude and longitude. Increasing trade and immigration throughout the 1880s prompted the Wellington provincial government to establish an observatory in Wellington Harbour (used to maintain accurate timekeeping for ships entering port) and construction of the Colonial Observatory in Wellington’s Botanic Gardens. As a prime location for observing future planetary transits and further establishing the burgeoning art of astrophotography, New Zealand shores attracted a multitude of visitors from abroad, including an American expedition to Queenstown in December 1874, British voyages to Burnham (Christchurch) in 1882 and intermittent visits from United States Naval Observatory in Washington, USA. Among a myriad of other social, political and economic changes to the New Zealand landscape, a rapidly increasing influx of enthusiastic stargazers arrived to set up private observatories, “taking advantage of the clear, unpolluted southern skies and the spirit of do-it-yourself innovation that prevailed in the early colony” (Hearnshaw, 2004; Wassilieff, 2006). Many of the observatories I visited in the course of my research carried the moniker of notable early amateur astronomers: for example, Thomas King (1858-1916) of Wellington, for whom the Thomas King Observatory (Botanical Gardens, Wellington) is named; Arthur Atkinson (1833-1902) of Nelson (home of the Atkinson Observatory, maintained by the local council and Nelson Science Society); James Townsend (1815-1894) of Christchurch (Townsend Observatory, now designated a heritage site by the Christchurch City Council) and telescope maker/optician Joseph Ward (1862-1927), of the Ward Observatory, Wanganui.<sup>27</sup>

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<sup>26</sup> A transit involves the passing of one celestial body – a planet, for example, in front of its parent star. When observed, the body appears as a spherical silhouette, and its movement and trajectory provides clues as to the distance from the parent star.

<sup>27</sup> Unfortunately, I have little room or time for providing a detailed outline of New Zealand’s astronomical heritage; to that end, I recommend Wayne Orchiston’s excellent book *Nautical astronomy in New Zealand: the voyages of James Cook* (1998), Peter Addis’ *The transit of Venus: how a rare astronomical alignment changed the world* (2007) or Elsdon Best’s seminal work on Maori astronomy, *The astronomical knowledge of the Maori: genuine and empirical; including data concerning their systems of astrology, astrolatry and natural astrology, with notes on certain other natural phenomena* (1922).

Contemporary astronomy is often associated with the activities of amateurs who have contributed to research, observations and publications in the latter half of the twentieth century. Prominent amateur contributors, and names that were frequently mentioned in the course of interviews, include Frank Bateson (1909-2007), founder of the Variable Star Section (VSS) of the Royal Astronomical Society of New Zealand (RASNZ) in 1927 and prolific observer of meteors, supernovae, dwarf novae and Mira stars. Bateson's work – including some 1000 star charts and over 300 scientific papers - was recognised with the Jackson-Gwilt Medal and Prize of the Royal Astronomical Society in 1960, an OBE in 1970, and an honorary doctorate from Waikato University in 1979. Likewise, Bateson's 'star pupil', Albert Jones (b. 1920) is generally credited as being the world's most productive observer of variable stars, having amassed over half a million visual observations of variable star magnitudes since the 1940's. In 1987 he co-discovered Supernovae 1987A (SN 1987A), located on the fringes of the Tarantula Nebula in the Large Magellanic Cloud, an image frequently reproduced on 'popular astronomy' posters, websites and charts detailing deep-space phenomena (Head, 2007; Hearnshaw, 2004). Given New Zealand's relatively small population and geography, it was with a sense of indomitable pride that interviewees recounted direct associations with, or memories of, Bateson, Jones and other 'world famous in New Zealand' astronomers with whom they had interacted over the course of their amateur career.

Despite the emphasis on personalities, the historical focus on the 'doing' of astronomy and science is invariably presented with a heavy emphasis on technical achievement. Perhaps it was for this reason, when asked to differentiate between 'astronomy' as a descriptive term and 'astronomy' as a 'pursuit', informants invariably segued into anecdotes that emphasised a personal philosophy to accompany their technical or historical definition:

I guess maybe for me...I would've walked around for the rest of my life looking down at the ground missing out on the universe above...I have a metaphor for people who aren't interested in astronomy [laughs]...'cause you've probably experienced this as well, you know, you mention astronomy and people go 'well, blah blah blah...who cares!' and all that. Well for me though, it's like, people like *that* are like people in a goldfish bowl, always looking inward, and they can't turn 180 degrees and look outside and through the glass you know, at the universe around them. I think astronomers are basically obliged to point out that there is something outside the glass, that goldfish bowl, and that's the point, to show them that, and I think it's urgent that we do.

Likewise, definitions of astronomy that include references to public perceptions of astronomy or science ostensibly highlight exaggerated categorical distinctions between astronomers and 'non-astronomers' in terms of attitudes to life and their immediate environment:

People generally say there's not much interest in astronomy, but people who say that are not much interested in life I think...astronomy has all sorts of aspects, some like the technical side, making telescopes, making cameras, using cameras...[T]elescopes enable us to look into deep space, star clusters, galaxies, big clouds of gas, where stars are being formed...it is that *connectivity*...this stuff is eternal, this

stuff just keeps going on...we used to have a sign at our observatory that said "Danger! astronomy may endanger your sense of self-importance!" [laughs], and some people will actually take exception to that, they don't like it, people think we should be more focused on 'all this' [grounded/tangible] stuff...<sup>28</sup>

Sociality was another common theme that emerged in interviews, both in attempts to contextualise the technical definition and in dispelling suggestions that astronomy was an individuated pursuit. Barry suggests that "...part of astronomy is looking up at the stars, and the other part is looking around at mates looking up...I think people just...well, people are social creatures, they just want some kind of social interaction, and if you can find that interaction with a group of people into the same thing, then that's the icing on the cake isn't it."

### 3.2 Amateurs: "on the margin between work and leisure"

**amateur** /'amətə, -tjuə/ *n.* **1 a** a person who engages in a pursuit (e.g. an art or sport) as a pastime rather than a profession. **b derog.** A person who does something unskilfully or amateurishly. **2 (attrib.)** for or done by amateurs (amateur athletics). **3 (foll. by of)** a person who is fond of (a thing).<sup>29</sup>

Although I have no intention of conducting an in-depth analysis of amateurism itself, a brief review of the term is useful to clarify its application to subjects studied in theories on contemporary leisure, as well as the context in which it is used when discussing New Zealand astronomers.<sup>30</sup> Like many definitions, the term is employed as one of contrast; a means to identify what one *is*, by expressing what one is *not*. In New Zealand for example, as of November 2008 only seven astronomers are employed as 'professionals' on a full-time, fully-paid basis, either by universities or research observatories such as Mt John, located in Lake Tekapo on the outskirts of Christchurch. Those that could be classified as 'amateur astronomers' on the other hand are geographically scattered and numbering in the hundreds, constitute a varying mix of levels in the astronomical community strata. Participants range from the those who occasionally surf the internet for the latest news and information, to the fanatical; owners of two, three or more telescopes (which are frequently homemade or heavily modified) who sink vast amounts of personal resources into attending every society meeting, star party, public night or conference, often with a tenacity and dedication unrivalled even by the 'professionals' with whom they are compared and contrasted. While only two of my informants displayed a level of devotion akin to the latter example, the majority of those interviewed for this paper could be comfortably categorised as 'amateurs' by virtue of the time, commitment and both monetary and ideological capital invested in maintaining their pursuit.

<sup>28</sup> Radio interview with Ian Cooper; *Our Changing World*; Radio New Zealand National, Thursday, 8<sup>th</sup> February, 2007; 9-10pm

<sup>29</sup> *The Concise Oxford Dictionary of Current English* (1995), Oxford University Press, New York, United States of America; ISBN: 0-19-861320-2

<sup>30</sup> It should also be noted that the current usage of the word "amateurish" is frequently pejorative, representing "something not well done or lacking in quality," – in the context of this study, a confusing situation if ever there was one.

The concept of the *amateur* in sociological leisure studies is frequently associated with Robert Stebbins' (1979) seminal work on the subject, in which he differentiates amateurs<sup>31</sup> from 'dabblers' or 'hobbyists', based on interest, devotion and identification with a pursuit or activity.<sup>32</sup> The early history of many contemporary professions - botany, natural history, and anthropology for instance - was made exclusively by amateurs; in the era before specialisation, astronomers earned a living doing something else, but were recognised as being an authority in their respective field of leisure (Stebbins, 1979:21).

Stebbins singles out a variety of characteristics specific to an amateur's engagement with their pursuit, such as perseverance in spite of difficult or serious obstacles; a 'career' that consists of "a history of turning points levels of achievement and involvement"; extensive skill, knowledge or experience; "durable benefits" including "self-actualisation, self-enrichment, feelings of group accomplishment, and enhancement of self-image"; and "a unique social world composed of special norms, beliefs, values, morals, events, principles, and traditions" (1996:46). While 'hobbyists' may dedicate a substantial amount of time and resources to their chosen pursuit, they are differentiated from amateurs by their failure to interact with a professional counterpart, or with any person or organisation for whom the pursued activity has a set of derived standards or values through which devotees can maintain a level of 'quality control' or measures of personal aptitude (Stebbins, 1979:34).<sup>33</sup> In this sense, amateurs are said to engage in a network of 'performances' that Stebbins classifies as P-A-P, or "Professional-Amateur-Public". This network of performances allows amateurs to engage with paid specialists in their field, both directly - by contributing to research - or indirectly, for example, via the emulation of organisational standards adhered to by professionals, or by acting as "publics" or consumers of professional knowledge (Stebbins, 1979, 1992).<sup>34</sup>

The classification of *amateur astronomer* builds on this elementary definition by appealing to similar motivational characteristics and distinctions between professionals and non-professionals. An editorial on the SETI<sup>35</sup> League website (<http://www.setileague.org>) on the subject of 'what constitutes an amateur astronomer' states:

[T]he individual must display a serious intent to contribute to the advancement of astronomy...by performing work that will provide information to other astronomers. The intent is to answer some question of importance to astronomy, or to develop information that would not otherwise be available to astronomers. There must be a regular effort to produce results over an extended period of time by

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<sup>31</sup> Stebbins suggests the following categories of 'amateur': the *dabblers*, or those with a limited, fleeting interest; *participants*, distinguished operationally by the amount of time committed to their chosen pursuit; *devotees* or those highly dedicated to the activity; the *pure amateur*, or 'fanatical' devotee; *pre-professionals* or those amateurs with aspirations to aspire to the rank of the 'paid professional', and *post-professionals* who have abandoned their profession but who still wish to engage with the activity on a part-time basis. (Stebbins, 1979:35-36)

<sup>32</sup> Of the 19 informants interviewed for this paper, 14 could be classed as 'true amateurs' who balanced their astronomical pursuits with full or part-time (non-astronomy related) employment, while the remaining 5 respondents were retired from the workforce.

<sup>33</sup> For example, an individual may dedicate excessive amounts of time and money to a hobby such as stamp collecting, which itself has no 'professional counterpart' or organisation by which progress or aptitude can be measured.

<sup>34</sup> The P-A-P network will be discussed in more detail in Chapter 1.

<sup>35</sup> Search For Extraterrestrial Intelligence

gathering data through routine observations, or through discovery or search work which can be either theoretical or observational. The work should be conducted using acceptable methods or techniques for the era, considering the application of the data. The program and its results should be communicated to other astronomers who may have need for the information to further their contributions to astronomy. Such communication includes liaison with other astronomers with common interests, sharing the results through publication in a journal or by submitting the results for collation with efforts of others for eventual publication...[While] a professional astronomer is a person who practices the science of astronomy for his livelihood [an] amateur astronomer does astronomy for pleasure rather than for money, and is likely to derive his income from other means than astronomy.<sup>36</sup>

Similarly, further investigation into science-oriented discussion boards, website forums and chat rooms suggested a similar emphasis on both the monetary (livelihood) and contributive (collection and sharing of data) aspects of astronomy in constructing definitions of ‘amateur’. The following forum posts on the astronomy.com bulletin board proffer some suggestions for distinguishing between ‘professional’ and ‘non-professional’:

[1] Technically, If [sic] an amateur had a job in astronomy, I would consider him/her a professional, if they make a living off of it. So I guess amateurs are here for fun, sometimes a little extra cash I guess, if they turn in some photos that get published in a magazine or something, and professionals are here to make a living. Amateurs still contribute to the advancement of knowledge, though. They sometimes make important, useful discoveries.<sup>37</sup>

[2] A professional is someone who holds an advanced degree in astronomy or who works as an astronomer with a bachelor's degree in astronomy or a related field (physics, chemistry, mathematics, engineering, etc.) I wouldn't consider someone with a bachelor's degree in astronomy to be a professional if they haven't worked in their field since college. (For example, someone with a B.S. in astronomy who now works as an engineer at a power plant would not be a professional astronomer, they'd be an engineer.)<sup>38</sup>

So far, most attempts to provide a working definition of amateur (astronomers) have incorporated work/play distinctions, an acknowledgement of the “durable benefits” to be derived for one’s self and identity, and an emphasis on the contributive nature of participation. However, an oft-overlooked element to amateurism involves the sometimes negative aspect of involvement, that of ‘one’s devotion pushing them to the fringes of normal social relations’. Stebbins (1992) argued that this marginality results in amateurs being forced into an ambiguous role, one that manifests itself in the tensions and resultant time constraints and negotiations an individual must make to maintain the level of commitment he or she desires. At least three of my informants had mentioned in post-interview discussions that they had, in the last 10 years, been involved in a separation or divorce from a partner that (personality conflicts aside) they

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<sup>36</sup> Williams, Thomas R.; April 2003: *What Is An Amateur Astronomer?* URL: <http://www.setileague.org/editor/amateur.htm>; last accessed 31 October 2007

<sup>37</sup> Unknown Author; posted 10th May 2006: <http://www.astronomy.com/ASY/CS/forums/301384/ShowPost.aspx>

<sup>38</sup> Unknown Author; posted 1 June 2006: <http://www.astronomy.com/ASY/CS/forums/301384/ShowPost.aspx>

believed had partially resulted from a dedication to their nocturnal activities.<sup>39</sup> Consequently, anyone constructing a working definition of ‘amateur’ may also wish to incorporate the following:

An individual who displays a noticeably enthusiastic devotion and contribution to a specific activity, pursuit or recreational pastime and who is (a) *not* employed as a professional in relation to that pursuit and (b) whose dedication to the pursuit marginalises, or has occasionally marginalised, other aspects (e.g. family, social relationships and/or employment) of their everyday existence, to the extent that associates and acquaintances identify that individual exclusively with their chosen pursuit above all other facets of their lifestyle.

Problematically, while this addition encapsulates the ‘at-all-costs’ devotion of the amateur and acknowledges the sometimes detrimental effect on relationships peripheral to the activity’s social network, it leaves little room for the retirees, ‘post-professionals’ and “armchair” astronomers (a phrase with shared roots in the annals of early anthropology and the natural sciences) who also fall under the umbrella of ‘amateur’ - those who engage with the subject matter and social traditions, but for whom dedication and adherence derives from years of reading and study as opposed to the ‘active’ endeavour of night sky observing. In this sense, the question becomes one of external versus internal classification; as an ‘external’ researcher on the fringe of a collection of dense social networks, I found many instances of armchair astronomers - some who had been very ‘active’ in their youth but had since retired - who still dedicated countless hours to reading and theory at great personal cost.<sup>40</sup> Additionally, many ‘armchairs’ were still regular attendees at local astronomical society meetings, involved with maintaining library resources for the group, or acted in administrative roles such as society treasurer or deputy president. Taking this into consideration, I was satisfied in the initial stages of research that from an external viewpoint the ‘armchairs’ constituted a part – some could even say a vital part – of the amateur astronomical community. However, as work progressed, I found that the *internal* classification – the perspective of the subjects under study – held an entirely different perspective on what constituted an ‘amateur’; an aspect of contributive participation that will be discussed in more depth in chapter one.<sup>41</sup>

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<sup>39</sup> Although it should be noted that for every suggestion of a partner or family member who “didn’t understand”, there were many other tales of enthusiastic family support and situations involving mutual advantage, especially where partners worked long hours or were employed in shifts.

<sup>40</sup> Some may suggest of course that by virtue of being ‘retired’, one has all the time in the world – an assumption that is extremely misguided if considering the relatively short time-frame retirees have to make use of the remainder of their existence! Likewise, the forsaking of travel or other activities one is ‘supposed’ to undertake once the children are grown up and employment has ceased, indicates a level of commitment on par with the ‘actives’ with whom they are most commonly compared.

<sup>41</sup> Additionally, I should point out that in his later work on amateurs and leisure participation, Stebbins (2001) creates a new distinction for the ‘less involved amateur’, that of the *liberal arts hobbyist*. The distinction is based in part on the profundity of one’s knowledge and expertise on a subject gained via active learning as opposed to more ‘passive’ means of acquisition (television watching for example; it is a safe assumption that repeated viewings of documentaries on Sky television’s History Channel would not constitute ‘active learning’). As ‘lifelong learners’ (2001:31), liberal arts hobbyists share much in common with ‘true amateurs’ as they are also marginalised (somewhat) by their dedication. As I will explore in more depth in Chapter 1, this marginalisation may also extend to members of their own ‘in-group’, should comparisons between ‘active’ and ‘passive’ learning become more overt given the nature of the activity.

Suffice to say, when making allowances for all facets of the amateur experience, attempts to calibrate the concept in absolute terms is exceedingly difficult. However, perhaps the most eloquent definition I came across - and one that intimated elements of all the preceding attempts to define the term “amateur astronomer” - came from one of my informants, who summed up one’s devotion in terms relayed to him by a friend and ex-flatmate: “And he said to me [*laughs*]...“it’s easy to spot an amateur astronomer in New Zealand...if it’s a clear night, and we’ve all made plans to watch the game and have a few beers or something...and well, the rugby’s on, but hang on - ‘Where’s Jimmy?’...he’ll be out in [his] observatory again looking at the stars! Bloody lunatic!””

### 3.3 *Leisure as a social practice*

**leisure** /ˈleɪzə/ *n.* **1** free time; time at one’s own disposal. **2** enjoyment of free time. **3** (usu. foll. by *for*, or *to* + infin.) opportunity afforded by free time.<sup>42</sup>

Although many aspects of the following will be revisited in subsequent chapters, it is worthwhile to provide an outline of what constitutes ‘leisure’ in the literature as the concept is a recurrent (and useful) framing device for contextualising much of what amateurs do in relation to broader social, political and economic themes.

Disciplines attempting to deal with the concept of leisure tend to define it in terms specific to the discourse of their chosen fields and methodologies. Economists, for example, may define leisure as rational choice conducted in market conditions that can be measured by economic change – or ‘non-work time’ defined in terms of monetary value. Social psychologists approach leisure as an individual state of mind displayed in attitudes that lead to activity and choice. Anthropologists approach leisure as an expressive activity embedded in the value system and practices of a culture. Sociologists see leisure as an activity learned in social contexts and requiring social resources (Kelly and Godbey, 1992:11). The Concise Oxford Dictionary definition proffered in the heading of this section is particularly ideal, in that it suggests a common folk conception of leisure as being categorically an activity taking place outside of time reserved for essential or mundane tasks, and makes appeals to dichotomous groupings such as ‘work’ and ‘play’, ‘constraint’ and ‘freedom’ or ‘obligation’ and ‘free-time’ (Witt and Ellis, 1985:106). For example, Kaplan (1960:22) suggests that, for activities to be considered ‘leisure’, they must demonstrate several identifiable characteristics (that in this case, invariably contextualise ‘free time’ within oppositional propositions that are themselves tied to conceptions of ‘work’): the activity as *an antithesis to one’s vocation as an economic function*; pursuits and activities that form “a pleasant expectation and recollection”, that also involve a ‘minimum of involuntary social-role obligations’; actions “characterised by the element of play”;

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<sup>42</sup> *The Concise Oxford Dictionary of Current English* (1995), Oxford University Press, New York, United States of America; ISBN: 0-19-861320-2



and perhaps most importantly, the *freedom* to choose to participate - or not to participate - in the activity in question (Stebbins, 1979:260; Kelly, 1983:15, 167).

While these characteristics may capture some common assumptions regarding what constitutes 'leisure time', the conception of leisure as a simple case of 'freedom' from work (which is almost unilaterally defined as being laborious, unforgiving, obligatory, limiting and generally 'unpleasant') is unsatisfactory for some. Rojek (1995:36-38) in particular suggests that the predilection for the 'work versus non-work' distinction stems from three schools of thought that have had indelible effects on the formulation of leisure studies; *functionalism*, *positivism* and *pluralism*.<sup>43</sup> While the latter concerns itself with power, and how political life functions to provide 'channels of articulation' (read: leisure activities) for diverse, dominant interest groups in society<sup>44</sup>, the former two favour statistical and conscious experience as quantitative data for determining the use of recreational facilities or 'spare time'; in this regard, society is realised as an 'organism' (with nods to Durkheim and Kroeber) which requires people and organisations to perform essential functions to maintain social order. As societal health requires work that is often tedious and laborious, leisure is seen as a tool to maintain the happiness - ergo, 'healthiness' - of society. Early sociological literature on leisure drew heavily from the functionalist and positivist approaches to form what Kelly (1983:182) identifies as 'systemic' models of society, in which functions necessary to society are fulfilled by institutions – the economy, the polity, families, schools and churches – and societal order is based on "common culture, socialisation into value systems [and] gradual change" which is "adaptive and amenable to reformist actions." In this sense, leisure is incorporated into this model and defined as "residual time left over from work and required maintenance" (Kelly, 1983: 183).

The primary issue with systemic approaches to studying leisure, according to Rojek, is that they exaggerate the observable in society and present it as overly formal; they make little room for a "variety of human experience[s]" and distil leisure practice down to simple laws of behaviour which are then applied to 'all societies in all times' (1995:38). Likewise, functional views of leisure as a 'relief from work' omit examples of leisure that develop inside the workplace (for example, harmony singing on the factory floor or online website games conducted within a call centre) as part of work culture.<sup>45</sup> Furthermore, the erroneous categorisation of leisure as being synonymous with 'pleasure' and self-actualisation overlooks the reality that some leisure activities can be boring and oppressive, requiring more commitment or

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<sup>43</sup> Within the context of leisure and consumption, Roberts (1995:243) describes the pluralist model as "a variety of public tastes that possess contrasting interests generated by different circumstances." People are influenced by commercial provision to use specific leisure resources, and in turn, leisure providers are responsive to public tastes.

<sup>44</sup> "Society" for the purposes of this discussion is defined as "an organisation of social actors identified in bounded institutions that are integrated into common action...[encompassing the] learned culture of individual socialisation, intimacy of primary relationships, laws and rules, protection and [the] enforcement of polity...[or] the *organised life of a people*." (Kelly and Godbey, 1992, my emphasis)

<sup>45</sup> Further to this point, Rojek (1995) observes that those who engage in the application of leisure theory must be aware that "facts cannot be expressed in social life without values imposing themselves...what is 'factual' [usually] reflects the values of the dominant group in society." Likewise, the 'facts' we take for granted may change; if our knowledge about people's social life changes, it does not necessarily mean that their behaviours will reflect these changes. Consequently, those 'facts' of the period that have been discredited may still wield a degree of influence despite the evidence stacked against them. (Rojek, 1995:37, 38)

obligation than one is comfortable devoting (one's role as a secretary or treasurer on a voluntary committee becoming more demanding for example). In this regard, some aspects of the leisure experience can become 'work-like', an antithetical proposition to the oft-repeated assertion that 'choice' plays a dominant role in leisure practice. Similarly, forsaking participation in an activity may lead to unpleasant costs, especially in scenarios where one stands to lose an identity centred around the activity (the characteristic of 'self-actualisation') and potentially alienate, or be ostracised from, social worlds involving friends, associates and beneficial acquaintances (Stebbins (2000:152). On this last point especially – as will be examined in chapter one – one also would potentially lose the audience to which one 'performs' in order to reinforce and perpetuate the locus of the self in which much time, energy and resources have been invested.

It is pertinent to point out that 'freedom' is "more of a slogan than a concept" (Kelly and Godbey, 1992:23). Time, money and social forces exerted on one's measure of self determination frequently serve to undermine 'free time' and skew it toward obligation and constraint. However, other perspectives (Neulinger, 1991 [c. Juniu, Tedrick & Boyd, 1996:46]; Witt and Ellis, 1985:106) suggest that the distinguishing characteristic of those involved in leisure activity is the level of *perceived* freedom attributed to one's pursuit: despite the feeling of obligation, amateurs are said to "work" at their "play" and "play" at their "work" (Ethridge and Neapolitan, 1985 c. Juniu, Tedrick & Boyd, 1996:46). Further to this idea is the fact that many amateurs engage in *contributive participation* or what Stebbins (1979) calls *serious leisure*. In this sense, their marginality extends to the concept of leisure itself; a rejection of the values and behaviours of passive consumerism or 'popular' leisure, of the type more readily associated with activities such as television viewing, gambling or the types of packaged holidays enjoyed by tourists. A key differential then between 'hobbyists' and amateurs (aside from the implied differential between 'hobbies' as being primarily 'consumer focused') is that the latter engage in the pursuit of an activity "so substantial and interesting that [they] launch themselves on a *career*, centred on acquiring and expressing its special skills, knowledge, and experience" (Juniu, Tedrick & Boyd, 1996:46; Stebbins, 1979:272, my emphasis). While equating 'career' with 'leisure' is useful for establishing the degree of commitment amateurs display, critics of this idea such as Rojek (1985, 1995) proposes that bracketing 'serious leisure' from other forms of recreation is problematic for a number of reasons<sup>46</sup>, suggesting that the focus on the amateur's quest for self-actualisation and personal fulfilment makes too many appeals to systemic models that overemphasise the integrative nature of leisure as reinforcing social order. Leisure has in the past (as

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<sup>46</sup> Additionally, Rojek suggests that Stebbins' approach to leisure "lacks a tenable moral dimension"; while 'serious leisure' might contribute to well-being and self-actualisation, the definition could easily apply to deviant activities – for example, drug use - that also utilise 'special skills' in their pursuit. Second, bonding leisure to the concept of career "reproduces a paradigm that paints leisure as driven by purposeful activity", negating the findings of various studies that demonstrate the prevalence of 'casual leisure' in an era where social conditions are becoming more episodic and anonymous. In this regard, any approach to situating 'leisure' in a societal context must acknowledge the forces of culture and change as a dimension of the recreational experience. As suggested by Kelly (1983:33), "the styles of engagement with opportunities and resources for leisure are shaped by cultural definitions...the rejection or adoption of available technologies differs according to the norms that develop within the culture." Television, watching DVDs, cinema or popular music provide a wealth of stimulation for those unwilling or unable to morally commit to more 'serious' leisure, of the type that Stebbins (1979, 2002) suggests is a hallmark of the amateur experience.

well as in the present) demonstrated a strong transgressive element as a mechanism for social change. Rojek points to examples involving the formation of organisations such as trade unions and political parties that have sprung from ‘leisure spaces’ - ale-houses, clubrooms and cafés for instance - where social mores can be put aside, examined, objectified and actions – not necessarily ‘integrative’ – can follow that attempt to redefine existing societal categories (Rojek, 1985:177).

In this respect, any study of leisure should acknowledge that action occurring within this social sphere is *action with a degree of self determination and meaning*. In line with contemporary theoretical approaches, Kelly and Godbey (1992:24) suggest that “a sociology of leisure requires a dialectical approach that incorporates meaningful action and organisational structures of the society”, including, but not limited to, the role of meaning and behaviour, symbolic communication and institutional structures, changes and regularities, conflict and co-ordination. Similarly, Rojek (1985) suggests four basic methodological tenets that should be taken into consideration in performing any analysis of actors partaking in the leisure experience. First, that leisure is an *adult* phenomena and should be defined in opposition to the play world of children. Leisure relations of the ‘self’ are structurally opposed to the selflessness of the child’s play world. As ‘selflessness’ is volatile and unpredictable, when it occurs in adult leisure (for example, when social norms and disciplines break down) it can “provide outcomes that are exciting, or dangerous”. Second, leisure is an accomplishment of skilled and knowledgeable actors who can manipulate social rules as resources for innovations and critical departures in leisure practice. Third, the structure and development of leisure relations is an effect of legitimating rules of ‘pleasure’ and ‘unpleasure’. Leisure relations are not relations of self-determination and freedom; they are relations of power whose dynamics and subjective meanings reflect the historically structured economy of pleasure in society. Pleasure is not an innate drive; it is an aspect of social structure. Fourth, leisure relations must be “sociologically examined as dynamic, relatively open-ended processes; historically, trend-maintaining tendencies such as privatisation, individuation, commercialisation and pacification combine to give modern leisure its distinctive form...they project the self [and] the individual body to the fore of leisure experience” (Rojek, 1985:177).

Rojek’s methodological direction builds on earlier interpretive models that includes highlighting the perspectives of actors, their consciousness, intentions and interpretations. Following trends set by Foucault (1969, 1971, 1975) and Giddens (1976, 1979, 1982) among others, the focus of research becomes one of the regularities of social interaction built out of intentioned decisions, acknowledging that society is both existential - built by decision and action - and structural, in the sense of having coercive power over behaviour (Kelly, 1983:186). In keeping with the methodological approach stated in section 2.4, it is from these perspectives that I undertake to analyse and interpret the actions, thoughts and behaviours of the chapters to follow.

## 4 Chapter Outlines

In Chapter One, *Performativity and Praxis: Amateurs, Astronomical Communities and Contributive Participation*, I outline the organisational and social-structural context in which amateur astronomers operate. This involves a discussion of attitudes to knowledge acquisition and contributions to science, the latter involving the role of anxieties concerning the survival of the astronomical community and more importantly, the amateur-professional collaborative process. I propose in this case that these anxieties perpetuate informal categorical distinctions within astronomical groups that culminate in attempts at social and moral regulation. Later discussions in this chapter include an examination of responses to perceptions of structural bureaucracy, put forward by members of the many observing sub-groups that operate within and alongside their local astronomical society. Finally, I analyse the role of the ‘virtual meeting ground’ in facilitating the regulation of individual behaviours that sustain an ethic of contributive participation.

Chapter Two, *Cosmological Communitas: Public Education and Social Reproduction*, involves a focus on the role of astronomical society volunteers in their efforts to educate the general public on the importance of astronomical science and the escalating problem of light pollution. In particular, I suggest that volunteers make conscious use of an existing touristic consciousness that, in conjunction with contemporary tourist ideals regarding authenticity and the natural world, assists in constructing a collective, liminoid experience of ‘cosmic awe’ that ties into broader strategies involving the social reproduction of ideologies pertinent to astronomical observation.

In Chapter Three, *Fake Stone, Real Wilderness*, I discuss the Stonehenge Aotearoa attraction in Carterton, New Zealand, touted as a functional adaptation of the famous British landmark. As a multi-vocal space that blends scientific experiment, tourist attraction, and an environmentally-cloaked ‘spiritual theatre’, the ‘Henge’ re-packages educational astronomy in ways that are distinctly different to the futurist aesthetics of established facilities such as Stardome (Auckland) or the ‘hands on’ demonstrative science of local astronomical societies. To this end, I examine the sites role in stimulating debate among the astronomical community regarding astronomy and education, culminating in a broader discussion concerning attitudes to truth and empirical knowledge in relation to postmodernity and science.

# Chapter 1



The Hubble Space Telescope (HST) in orbit above Earth.

## *Performativity and Praxis:* Amateurs, Astronomical Communities and Contributive Participation

Image credit: NASA; *Public Domain image*  
GRIN Database Number: GPN-2000-001064;  
Image # : STS082-746-059  
<http://grin.hq.nasa.gov/index.html>

## *Stargazing Aotearoa*

### **Brightest comet in a century astonishes Taranaki**

By Sharon Marris, *Taranaki Daily News*

Thursday, 18 January 2007

Taranaki people watched awestruck last night as one of the brightest comets in a century appeared out of a summer sunset. The Mt Moturoa lookout was thick with cars and people settling in for the best view of what was described by those-in-the-know as a once in a lifetime experience. New Plymouth comet hunter and Astronomical Society member Rodney Austin is one of those-in-the-know and by 8.30pm he has already found his spot where he sits, eyes glued to binoculars.

"This is only the third comet visible to the naked eye in broad daylight in my lifetime," he says.

Comet McNaught, named after the Australian astronomer who discovered it last year, was billed as the brightest comet in the past 40 years, much brighter than the famous Halley's Comet. By 8.50pm, Mr Austin is a little concerned. "I can't understand why I can't see it," he says, scanning the horizon as the sun goes down. "It should form an isosceles triangle with Venus and the sun." He isn't the only one.

"I hope it comes out before curfew," from a younger comet watcher. One bystander told the group of seeing the comet on Tuesday night, from inside a plane travelling from Australia. "We could see it for about two hours," she said. "It was amazing." By 9pm the road is lined with cars. There is excitement.

"Got it," one person says. This is immediately met with "where?". But to the naked eye, the comet remains invisible. Fifteen minutes later, however, the comet, 124 million km from earth, can be seen in all its glory.

"It's classic," says one observer, jaw down and binoculars up. "I've never seen anything like it." Mr Austin, too, is happy. "They really give me a buzz, these things," he says. He has seen about 120 comets in his lifetime and discovered three of them. The tail is six degrees in length which is equivalent to 15 million km. Mr Austin says the tail should continue to swing and lengthen over the coming days. Mr Austin expects the comet will be gone by 10pm but it could stay up later tonight - 10.30pm, he thinks. The Taranaki Daily News phone lines ran hot last night with people calling to report comet sightings. Journalists could not remember a night with so many phone calls since the Grumpy Mole used searchlights to enhance their opening night, prompting calls reporting UFO sightings. Comet McNaught is expected to be visible for three weeks but for those who miss that, there is always hope of another lifetime.

When Comet McNaught (International Astronomical Union designation *C/2006 P1*) trailed past Earth and became visible in New Zealand skies between December and March 2007, it was, as one of my informants put it,

the best thing to happen to New Zealand astronomy in decades. Everyone could see it, everyone was out there, didn't matter *who* they were you know, some nights you could just look out the window and you know, 'there it is'...And even though the weather was playing up, it was around for long enough to get a good look and take some decent shots...Even better than [Comet] Halley [1986], at least in my opinion, maybe even better than [Comet] West [1976]...that was hard to top though. I got over to Aus[tralia] for that one. [A friend] told me about [Comet] Ikeya-Seki, that was back in 1965 I think, I might be wrong...I wasn't around for that one [*laughs*] but it was brighter than [that] he reckons, about 5.5 [magnitude]...McNaught was just brilliant. One of the great comets, marvellous. Hands down, 10 out of 10.

During its initial approach toward Earth the New Zealand astronomical community bulletin boards and email groups were rife with discussion. Popular websites *Space.com* and *Astronomy* dubbed McNaught “*The Great Comet of 2007*”. Topics on the various Yahoo™ and Google™ Group sites ranged from ‘The best method of taking photographs’ to ‘What setup are *you* using?’; ‘Where are the best observing spots?’ to ‘Who’s going to give a talk on comets at the meeting this week?’<sup>47</sup> For some regular contributors to the forums however, there was a more pressing issue: ‘It’s only around for a month. How are we going to *use* this to market astronomy to the public?’



FIGURE 1. *Comet McNaught (C/2006 P1)* as photographed on the afternoon of the 20th January, 2007. Credit: Chris North; South Auckland, New Zealand; (public domain)

Despite concerns from some on the boards that local communities were apt to miss the significance of this cosmic opportunity, the anxiety seemed to have been misplaced. Local media around the country snapped up the story, turning attention toward what one informant suggested was “at the time...the hugest [sic] banner advertisement for astronomy in the sky you could get” and becoming, for a time at least, a surrogate science teacher for the New Zealand masses: “*Brightest comet in decades - Comet McNaught*” (Scoop.co.nz; 25<sup>th</sup> January, 2007);

“*Comet lights up Rotorua skies*” (Rotorua Daily Post; 19<sup>th</sup> January 2007); “*Comet adds touch of magic to evening skies over NZ*” (NZ Herald; January 16<sup>th</sup>, 2007); “*Comet McNaught – the best time to get a good*

<sup>47</sup> Given the vast amount of information contained in both groups on these topics, it would be impractical to include them here; however, a sample of archived conversations can be found at the Yahoo™ Groups page: <http://tech.groups.yahoo.com/nzastronomers>

*look*” (Western Leader (Waitakere); 23 January 2007); “*Stars in their eyes*” (The Press; 03 February 2007). Over a period of four weeks, McNaught was a practically ubiquitous feature of ‘lifestyle’ and ‘special interest’ sections of local newspapers. Some ran feature-length articles on cometography<sup>48</sup>, the best locations in the region for viewing, and contained statements by local amateurs on how to use binoculars safely so as not to blind oneself by accidentally catching an eyeful of the sun. One informant relayed a story heard from a local retailer, probably apocryphal, that New Zealand telescope sales for the month of January had increased 20 percent over the monthly average.

Given that I began research for this paper just after the McNaught phenomenon, the experience was still fresh in the minds of my informants. One interviewee with a particular interest in astrophotography was almost bewildered at the extent of interest shown by the general public:

With Comet McNaught in January, I’ve *never* seen so many photographs. People see it in the paper, everyone wants to get out and see it...Everybody was getting out there, taking photographs...and it wasn’t just astronomers, but members of the public, you know, *all* the good viewing spots here were full...[Wellington’s] South Coast, Wright’s Hill, Mount Victoria...in the end we went up to Hawkes Bay for Stardate, up to [the] ‘Peak’, this really good spot, and everyone was up there taking photographs, it was amazing...it was like it was this thing, the biggest attraction on Earth, the whole planet was looking up to see this amazing comet like it was the Taj Mahal or the Pyramids or something. *Everyone* got photographs...even little kids doing it...Amazing.



FIGURE 2. *Comet McNaught (C/2006 P1)* photographed at dusk on the 20th January, 2007.

*Image Credit:* (Unknown); Lawlers Gold Mine Western Australia; (released as ‘public domain’ by the photographer; 2007)

Likewise, when Radio New Zealand’s National Programme ran a series of features on McNaught it gave amateur astronomers from around the country a chance to highlight the unique experience that only astronomy can provide. David Downing from Christchurch remarked that “I like looking up and seeing how insignificant we are. Here is everybody thinking they’re God’s gift and you think, nah, they’re psychotic. We are less than a grain of sand. That gives me a sense of well-being; for others it might scare them senseless” (Downing, quoted in Philp, 2007). Astronomer Ashley Marles commented that “we spend half our lives under a night sky...But a lot of people hide indoors at night, watching TV, playing on their computer, without ever knowing what is whizzing around above them” (Marles, quoted in Philp, 2007). For others with international observing experience, the coverage also provided a chance to engage in a bout of quasi-nationalistic sentiment:

<sup>48</sup> The study of comets and phenomena associated with comets.



You get all these books that are written in the Northern Hemisphere...the books about the Southern Sky, half of [the authors] have never been here, and if they did come down here they'd never go home!...That part of the sky...through the hole there...in that area, that's one of the richest parts of the sky for observing...some places of the world *never* get that...that's *our* part of the sky, they can't have it! <sup>49</sup>

In New Zealand's capital city, the Wellington Astronomical Society held a number of well-attended viewing nights, including public lectures on comets and general astronomy in association with the Carter Observatory. The Royal Society of New Zealand publication 'Southern Stars' summed up the flurry of activity with an article by astrophotography expert John Drummond, the modestly titled "*Comet McNaught 2006 P1 - the Comet that Blew our Socks off.*" <sup>50</sup>



FIGURE 3. A series of frames from TVNZ's *Close Up* programme with Mark Sainsbury (broadcast 5<sup>th</sup> February, 2007) focusing on Comet McNaught, with excerpts from a music video created by Christchurch film-maker Brian High.

McNaught began to diminish in magnitude toward the middle of February, and was no longer visible with the naked eye by the beginning of March 2007. As the experience and images of *C/2006 P1* faded from the public consciousness and became a footnote in the archives of various websites and magazines, so too did the media coverage. Television and talkback radio shifted away from the cosmos and back to the staples of crime, rugby and politics. National Radio resumed its normal programming, relegating all things astronomical back to the weekly *Nights* segment with resident astronomer Alan Gilmore and host Bryan Crump. Discussion in the various internet chat-rooms mirrored the media coverage, turning back to

<sup>49</sup> Gordon Hudson (Wellington Astronomical Society, Carter Observatory); *Our Changing World*; Radio New Zealand, Thursday, 8<sup>th</sup> February, 9-10pm

<sup>50</sup> Abstracts for the *Southern Stars* journal can be found at: <http://www.rasnz.org.nz/SouthernStars/SSAbstracts.htm>; last accessed 31 February 2008

familiar topics such as telescope calibration and light pollution. The international tourists went home, or moved onto other attractions. And the many amateur astronomers interviewed throughout the country faded back into anonymity.

While the media coverage highlighted astronomy to the public and created a medium for astronomers to communicate a range of ideas and insights beyond the focus on McNaught, some in the astronomical community expressed disappointment that the experience could not have been extended further. “I was definitely disappointed,” one of my interviewees stated during an informal conversation, “we didn’t really get much interest after McNaught shot off...there were families you know, who had come up to the observatory and were interested in joining [the astronomical society], but we never saw them again.” Others however were more philosophical; one of my early respondents recalls his own experiences approximately one month after the comet’s disappearance:

Yeah well, it happens you know, that interest...I grew up in the States you see, I was a kid you know, 14 years old when they had the original Apollo [landing] in 1969, I remember watching it on TV...it was amazing then, it still is really when you think about all the work that went into it...the media...I mean the whole thing was just huge, it was everywhere. There was all the political stuff going on with Russia at the time, but people were just amazed at the idea that we were sending men, they were actually, you know, going into space, landing on the moon...after that it all died off, the viewership ratings for the other missions, you know, they barely rated a mention in comparison, even though they were more exciting in my opinion because of the science of it, and what they were there to do...but that’s the way it is with these things, the [media] exposure is great, it gets people really excited, but then its over and it becomes ‘oh yeah, just another mission’ you know...[McNaught] was the same thing...some people just forget...

In light of a forum poster’s earlier suggestion that McNaught had potential as a valuable marketing opportunity, one of the themes for the first chapter of this paper could be that “marketing begins at home”. *C/2006 P1* provided an aesthetically pleasing experience, and even stimulated some degree of interest in the wider universe. But contextualised - as it was - through popular forms of media, it could be argued that the profound scientific importance was lost on the general public in the rush to utilise the very medium of communication that Ashley Marles had suggested kept people “hiding indoors at night.” To this effect, the chapter that follows deals with the methods employed by those who at some point have recognised that an over-reliance on external stimulation (both cosmic and television-based) is not enough, seeking instead to engender a sense of appreciation for the science of active observing by encouraging it in places where it matters most - among the social networks of their own backyard.

## Introduction

This chapter consists of two interrelated parts. The first of these is primarily descriptive and outlines the organisational, social and structural context in which amateur astronomers operate, incorporating informants' accounts regarding attitudes to knowledge acquisition, contributions to astronomical science and the practice of amateur-professional collaboration. These attitudes are of particular interest in the way they facilitate the creation of informal categorical distinctions within astronomical groups, between those involved in collaborative and contributive activities, and those who are perceived to merely 'consume' them. This distinction, coupled with the observed practices of my informants, forms the basis for my proposal that those involved in contributive processes attempt to morally regulate behaviour among members of the social worlds to which they belong. To this effect, I explain traditional approaches to the theory of moral regulation, and outline how a reformulation of these approaches provides a framework through which morally regulative action can be interpreted.

The second part of this chapter focuses on how informants and practical observers utilise resources to enact demonstrative projects that aim to regulate an 'ethic' of contributive participation. The first of these examples concerns the role of informal observing sub-groups that operate within, and alongside, their local astronomical society, followed by a discussion of the virtual meeting ground of the internet, in which participants may assert and reaffirm identities that seek to normalise behaviour among other members of the New Zealand astronomical community.

### The Royal Society and the structure of New Zealand's astronomical community

The membership of a typical New Zealand astronomical society is fairly heterogeneous, comprising a varied mixture of ages and occupations, including engineers, secretaries, salespeople, doctors, librarians, teachers, nurses, accountants and public servants. The common feature inherent to all members however is that their chosen pursuit is enmeshed within a complex hierarchical framework that oversees many of the activities of the New Zealand astronomical community. The historical foundations of this framework begin with the *New Zealand Royal Society* which was established in 1867, a direct offshoot of the British Royal Society. The society operates as an independent agency, established under The Royal Society Act to "promote a critical awareness of science and technology issues in New Zealand societal and business affairs and...work towards an informed and educated society."<sup>51</sup> The society runs an operating budget of \$7.2 million (2006/7) of which \$3.75m comes from the Ministry of Research, Science and Technology (MoRST) in payment for administering funding and investment activities on behalf of the government. The society also publishes eight journals annually, and operates various committees and sub-committees that

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<sup>51</sup> *New Zealand Royal Society guide*, pages 1, 2 - (Word Document, 190K); <http://www.rsnz.org/directory/rsnz-guide.doc> (last accessed 9 November, 2007)



FIGURE 4. From top to bottom: Logo of the International Astronomical Union, Royal Society of New Zealand, Royal Astronomical Society of New Zealand.

represent and participate in information exchanges between international scientific bodies. One such committee is the Royal Society Committee on Astronomical Sciences, headed by 6 or 7 professional<sup>52</sup> astronomers and a main link to the International Astronomical Union.<sup>53</sup> The Royal Astronomical Society of New Zealand (established 1920) is one of over 60 affiliates of the Royal Society, receiving the Royal Charter<sup>54</sup> in 1946 and becoming a Royal Society Member Body in 1967. The RASNZ includes both professional and amateur astronomers involved in various collaborative programs and a number of *sections* (special interest groups such as aurora and solar activity, comets, minor planets, occultations<sup>55</sup>, double and variable stars) which cater for groups with similar observing interests. Sections provide a dual function in that they allow individuals to specialise in a chosen field while furthering social and professional networks beyond the realms of their local astronomical society.

As of November 2007, the RASNZ website lists 27 affiliated<sup>56</sup> astronomical societies<sup>57</sup> spanning the entire country, from Dargaville to Invercargill. Each affiliated society is run exclusively by amateur astronomers, with some having strong ties to professional observatories (for example, Mt John in Lake

Tekapo, Christchurch) and caters for both active observers and those with interests in pure theory or cosmology. Services provided to members typically include the organisation and scheduling of observing nights, telescope hire, regular newsletters, journals and library resources. In addition, the majority of societies maintain their own observatory, ranging from the spacious to the claustrophobic, for the benefit of members and as an intermediary space for public education, either in conjunction with their district council or as an independent fixture located on private land. Information on astronomical society activities is freely available online, and potential members with an interest in getting involved can usually find what

<sup>52</sup> Although it should be noted in this particular instance that the term 'professional astronomer' is somewhat misleading; the description afforded by the committee website lists as 'professional' those who have attained academic degrees in astronomy, but who may or may not be currently employed in the astronomical field.

<sup>53</sup> Otherwise known as the international body responsible for the demotion of Pluto from 'Planet' to 'Kuniper Belt object' (a region of the Solar System extending outward from the orbit of Neptune) in 2006.

<sup>54</sup> A designated title acknowledging authority in a particular field and the ability to provide a public service.

<sup>55</sup> An occultation occurs when one celestial object passes in front of (eclipses) another. The majority of amateur astronomers in New Zealand focus on *lunar occultations*, when the moon passes in front of a star, providing the opportunity to view the star moving in and out of the various mountain peaks or *terrae* on the moon's surface.

<sup>56</sup> While a group affiliation to the RASNZ is not mandatory, it is generally encouraged as a means to broaden social networks, keep abreast of RASNZ and Royal Society publications and activities, and contribute research information via established channels.

<sup>57</sup> As of November 2008, affiliated astronomical societies on the RASNZ site were listed as: Northland Astronomical Society, Auckland Ast. Soc., Northern Observational, Auckland, Molehill Ast. Group, Northshore City, Franklin District Astronomers, Hamilton Ast. Soc., Rotorua Ast. Soc., Tauranga Ast. Soc., Whakatane Ast. Soc., Gisborne Ast. Soc., Napier: Hawkes Bay Ast. Soc., New Plymouth Ast. Soc., Hawera Ast. Soc., Wanganui Ast. Soc., Foxton Ast. Soc., Wellington Ast. Soc., Gifford Observatory Trust, Wellington, Nelson Astronomical Society, Canterbury Ast. Soc., Christchurch Oamaru, North Otago Ast. Soc., Central Otago Ast. Soc., Dunedin Ast. Soc., Southland Ast. Soc., Invercargill, Skydome Obs. Gp. Dargaville, Coromandel Ast. Group., Palmerston North Ast. Soc., Phoenix Astronomical Society. (<http://www.rasnz.org.nz/affsoc.htm>; last accessed 9 Nov 2007)

they need with a minimal amount of effort. To this effect, societies maintain and update a list outlining their goals and objectives which are available either from a nominated contact, or, as in the following example, from the Tauranga Astronomical Society Website:

***Goals and Objectives of the Tauranga Astronomical Society***<sup>58</sup>

- (1) To promote and foster the science and hobby of astronomy and related technology in the western Bay of Plenty;*
- (2) To encourage and foster associations and groups interested in astronomy including other organisations, clubs and schools;*
- (3) To cooperate with, advise and assist all persons interested in the science and hobby of astronomy;*
- (4) To arrange viewing nights for members and, at times for the public, at chosen sites using various telescopes owned by committee members and others;*
- (5) To set up and run an observatory at a suitable site for membership and community use;*
- (6) To encourage and foster the education of children in the science and hobby of astronomy and arrange lectures and demonstrations for schools;*
- (7) To make available a number of telescopes for loan use by Society members;*
- (8) To advertise and promote the planned observatory project among the local community;*
- (9) To plan for future expansion of the observatory to include a planetarium.*

The main focal point for social interaction between subscribing members is the society meeting. Meetings are generally held monthly at a venue – a hall, lecture theatre or large room - that may be supplied by either the local council, a sporting group, a local school or in rare cases, a privately-owned building. As a general rule, society meetings follow a standardised format: there is a welcoming address by the society president, announcements of business are made, people compare notes and listen to talks by guest lecturers. The meetings conclude with informal socialising over coffee, tea and biscuits. The presentations – generally given by a society member, but occasionally by someone external to the group such as an astronomy PhD student – are the centrepiece of the evening, and are commonly the front-page focus of the local society newsletter sent out to members approximately two to three weeks in advance.

Despite a wealth of information on society activities, the actual number of non-professional, backyard astronomers nationwide is difficult to ascertain. In a larger city such as Auckland, Wellington or Christchurch, societies may have anywhere from 450-600 members who contribute annual dues or membership fees, whereas my research in towns with smaller populations suggested an average attendance of 15 to 20. My experiences of meetings in larger cities suggested that on average, only 30 to 40 paying members attend monthly meetings regularly. Estimates of total numbers are further complicated by the fact that many informal observing sub-groups exist as both a part of the affiliated astronomical society, and as a separate social network that may eschew the official meeting environment altogether. Likewise, interested members of the general public with no prior experience in astronomical observing may regularly attend

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<sup>58</sup> <http://tauranga-astro.150m.com/aims.htm> (last accessed 14 August, 2007)

scheduled society meetings if the committee condones and encourages their attendance.<sup>59</sup> While membership statistics are scarce, society websites are generally informative, and provide detailed accounts of available equipment, planned events and membership information for those interested.

### *The view from the interior*

When the question of membership statistics and committee makeup was raised with my informants, any forthcoming information on the subject was invariably framed in historical terms; one interviewee stated unequivocally that attempting to make sense of ‘the nuts and bolts’ of how things worked within the society required “getting the whole back story”. This generally involved the history of the town, significant local figures and inevitably, the construction of the local observatory - a topic that almost universally book-ended informants’ recollections or personal histories, with detailed explanations of which local figures were involved, who bequeathed money in their will (a recurrent situation in smaller towns, and a suitable catalyst for members of the time to acquire the land, telescopes and other technical items necessary for its operation) or which figures were most active in gathering information using the observatory soon after its inception. In this sense, “observatory stories” provided a useful means to associate past and present, and assisted in creating a central focal point for contextualising the activities of the society and its members:

The Cook observatory...that used to be a gun emplacement, when you walk up the steps to the observatory part...there’s a little place facing Gisborne, that was the actual observation post where the soldiers used to sit looking over Poverty Bay, and look out for Japanese submarines during the war...as you walked up, from the car park, you may have seen it, the big concrete structure, the gun emplacement, and that was there to blow away any Japanese subs out of the water...[the] observatory was opened in 1971, and at that time...the society was very strong, we’re talking about 1973 or 1972, I was about 12 years old, gosh, 11 maybe, and through 1973 and 1974, and 1975, the society had a junior section, and the junior section was the *active* section, you know, always up the observatory...the seniors, the *seniors* didn’t quite have the same drive to get out there you know [*laughs*]...there was, there was a lot of politics going on with the seniors, personality conflicts and that sort of thing...but the junior section, all we wanted to do was observe the stars, and we’d get up to the observatory as much as possible, and do meteor watching throughout the whole night, great memories, basically, they’d be maybe, eight of us, ten sometimes, and we’d be, half would be up on the roof, half would be downstairs working a recording system...when we saw a meteor, or a star, we could dial it in, and the guys downstairs would put it in the notes, and yeah, we had great fun up there, every now and again some beer would turn up, or a Playboy [*laughs*], you know, typical teenage boys...

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<sup>59</sup> Although I have noticed that this varies greatly between towns; some groups are happy to accept “drop-in” members, and circumvent any potential financial difficulties by explicitly charging non-members for attendance at scheduled observatory sessions. Other groups were more overt in their requests for regular non-paying attendees to make a small donation on their next visit to assist with ongoing society costs.

This appeal to history conveyed by interviewees is not, however, the result of simple nostalgia. Changes in group leadership, meeting venues and the demographic makeup of members are factors entrenched in the minds of long-term society members who view attempts to surmise the society's current state of affairs without reference to its continually shifting composition as only giving 'half the story'. Likewise, it is rare – larger cities perhaps being the exception – to find an astronomical society that, in practice, fits the “standard” committee model as conveyed through impressions gleaned from either the Incorporated Societies Act (1908)<sup>60</sup> or RASNZ member affiliate websites. A prime example, and one that references the nature of the group in relation to the larger RASNZ hierarchy, is provided here courtesy of one of my early interviewees:

Because [we're] a section<sup>61</sup>, that's how we're able to operate. Normal societies have rules, a constitution or something. What *we* do is operate under the [local] Science Society, and they have a set of rules. It's officially registered with the RASNZ, and so being a section we're quite informal. There's some rules though...we have provision to take donations and maybe encourage people who come along to join the [local] Science Society. Basically I call myself the dictator [*laughs*], I mean we can hold an election, cause one person can be the treasurer, and I can be, whatever, the president, and that was the one election back in 1998 or whatever, my wife usually serves as the secretary and treasurer, and we have a separate little bank account, and at the end of the year we compile the financial report that gets audited and sent off to the Royal Society and all the legal mumbo-jumbo that goes with it, so that, we don't have to worry about all the overheads, we're just extremely informal. And the [local] Science Society is good; it's just run by the president and the secretary. Every two years you have to have a meeting like an AGM, and you elect a president as a part of the process, but that's about it, otherwise it's informal, and they submit their financial reports once a year to the Royal Society, and us, as we're affiliated with the Royal Astronomical Society we submit our reports to them. And we, we just collect donations, there's no dues or anything, and that money for example goes towards repairs or whatever's required to keep the thing running.

Likewise, some members of societies in smaller townships were particularly fond of the distance they felt they were able to maintain from certain “bureaucratic elements”; some even went so far as to suggest that occurrences of ‘going into recess’<sup>62</sup> could be viewed in a positive light, allowing an informal environment in which to operate as well as a focus on the social nature of the activity:

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<sup>60</sup> Astronomical societies carry the label ‘society’ by virtue of their registration as a group under the Incorporated Societies Act (1908). The [societies.govt.nz](http://societies.govt.nz) website outlines the requirements for starting a registered society as being “an application form signed by fifteen members, with signatures witnessed by someone who has not signed the application form as a member, a copy of the society's rules certified by an officer of the society and a \$100 filing fee.” Among other regulations (including being a not-for-profit operation), societies must provide annual financial statements certified by a registered accountant, and provide detailed accounts of (1) How people become members of the society; (2) How the society can change its rules; (3) How meetings are held and how voting takes place; (4) How office holders within the society are appointed; (5) How the society's funds will be controlled and invested; (6) The powers (if any) that the society has to borrow money; (7) How any property of the society will be distributed in the event of the society is wound-up. Additionally, groups must provide a common seal for legal documents. More information may be found at: [http://www.societies.govt.nz/cad-docs/F/FS\\_Start\\_Inc\\_Soc.html](http://www.societies.govt.nz/cad-docs/F/FS_Start_Inc_Soc.html) (as of 30 April 2008)

<sup>61</sup> A ‘section’ in this particular case denotes a sub-group of a larger, *local* society and should not be confused with the ‘sections’ operating within the RASNZ framework.

<sup>62</sup> When membership drops below 15, the group is no longer considered a registered society and has the option of self-suspension (as opposed to winding up or closing down the society for good).

The unstable nature of this particular group...makes your job a lot easier...There are a few people here that are what I call 'hardcore', the long term members who have their own telescopes and things, and there are others who are sort of long term members who stay for a while and then sort of drift off. Although I've served on the council of the Royal Astronomical Society and stuff, I've never been a big fan of all that formality and everything. At least here all I need to do is get everyone together and give a few talks and stuff, it's all extremely informal...in the States I was an engineer building software, I never wanted to be a manager or anything, or supervisor or that kind of thing, I just liked doing the work. Have a meeting once a month, have a talk, get out and observe, coax people out to the observatory on public nights...it's really just an informal social group.

However, while some viewed the informal nature of the group as an affirmative, almost ideal situation, some were genuinely dismayed by the lack of newer members to the society, and expressed a wish for the group to rise to the peak membership levels of previous years:

Yeah, I was sixteen when I [joined]...there were just more people, and they were younger, they weren't all retired...they were active observers and they were quite ambitious, and when I came back in 1997 there was nothing at first, and it was like "well we've been in recess for 11 years", they had just got tired of listening to the same people in the same group talking about the same stuff to each other. It was really bad.<sup>63</sup>

Likewise, informant Harold recalled that "in 1969 or 1970...there was more people, there were more wives involved in the whole thing, [it was] a lot more family oriented than it is now...I mean there's a lot of grey-haired people, and the senior membership is all past and present scientists or academics, most of them worked at the Cawthorne Institute, the DSIR or NIWA...And the question arises you know, what happened to the younger families?...When I saw it here for the first time about thirty years ago, it was a lot more family-oriented than it is now..." This distinction drawn between young and old, and the sentiment expressed for both a 'family-focused' and 'more youthful' membership reflects a common theme that ran throughout my respondents' personal narratives. A sample taken from my scratch notes suggested that on average, older members dominated attendance at society meetings and that fewer wives or partners were actively involved in astronomical society events:

[April 2007] *Small group tonight. Approximately 12 members present, 11 men, 1 older women. One late thirties/early 40-something male with two younger children though dominant age approximately 60 to 70 years. Most retired / close to retirement.*

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<sup>63</sup> 'Falling into recess' for smaller groups seems to occur once every 10 or 15 years. Many interviewees recounted stories of the 'peaks and troughs' of membership; for example, Barry recounted that: "my mentor...back in the late eighties, the director of the museum there, he got the society going again and got more members and so on...it was functioning very well, and then he went to Carter Observatory, as the executive director...once [he] left I went to Auckland to do teacher training, and after that the society basically died off in the early 1990's, and has been like that for the last fifteen years I guess. And then February of this year we decided to get the society up and running again...we get along about 10 or 11 members along to most meetings these days."



[May 2007] *Majority of audience males, aged approximately 55+, smaller proportion of female members (I estimate 15-20%) compared to other group meeting from previous week. Total present somewhere between 40 and 60 people.*

[June 2007] *Quick glance say 70% male, 30% female approx. Age groups. [Michael] + myself youngest (27 – 30 years) – rest comprise ages 40, 50 etc. to 70 with I think 80+ year old gentlemen (looks fairly elderly anyway). Approximately 50 members present in total.*

Interviewee John had observed that in his experience, “a very low percentage carry on with it...the ‘young astronomers’ group, there’s only a handful of people coming through each year, [there’s] younger ones that carry on with it, but not as many as we’d like to see getting involved.” When asked to provide reasons for the lack of youthful membership, many respondents cited the society’s locality as a deterrent. Richard suggested that “unfortunately, New Plymouth is like a lot of small towns...all the brains heads off to university...we get them interested, but then they shoot through...”, a sentiment shared by Joel from the South Island’s west coast:

I mean, we don’t have a university here...they [younger members] tend to go off elsewhere and the interest they’ve been instilled with, you know, the *knowledge* side of it, they take that away with them...well, they’ve got their brains, and gone somewhere else, and we never see them again. And that as they say, is that. Bloody depressing when you consider the work put in, you know, trying to get them [interested in astronomy].

Declining memberships aside, another problematic aspect of the transient “youth brigade”, as one informant described them, was the perceived lack of appropriate ‘attitude’. In particular, older interviewees’ personal recollections of their own youthful observing sessions were often annotated with comments on the mindset of younger astronomical society members: We’ve got *some* young people...but...well, they tend to be from that mode of thinking, the ‘instant gratification’ side of things...You have to have a lot of patience for doing astronomy...it takes time to get things lined up, and to look out at the sky, and the younger ones just don’t seem to ‘have the time’...I think it’s because of that, that you tend to get a high turnover of interest... I wish I knew the golden formula for stimulating interest permanently...it’s *very* difficult with the younger ones these days.” Further probes to the ‘instant gratification’ reference generally evoked comparisons to video games, television, the internet and ‘over-socialising’ (understood to be verbal shorthand for “hanging around with friends at the expense of participating in astronomical society activities”) as immediate competitors for interest. While this was usually contextualised as a desire to see the local astronomical society avoid “falling into doldrums”, these discussions were often paired with an expressed desire to see more scientific education for children and young adults, sometimes embellished with observations of current social trends – that of “entertainment versus education” - or a general unease with the lack of scientific information being communicated to younger generations of potential astronomers. Martin expressed his frustration on this topic as follows:

Well, it's difficult...you know another member, that's the one you spoke to or are going to speak to...he said to me the other day, we'd been discussing some of the [younger] members and he said that "science isn't squealing your tyres up and down the road at three in the morning" or something to that effect, and it, well it was...I knew what he was getting at, all the young ones, they're all interested in cars, or what's on television and just want to be 'entertained'...I mean some of the older fellows here, they don't get out much anymore and might like to sit and watch the news at night or whatever, but...but it's as though, they've done their bit you see or they've had that experience or what have you...it's remembering when you became interested yourself...you want to try and have that same...*experience* for [some] of the younger fellows out there, you know, that 'trigger' when you saw something [astronomical] for the first time and thought 'that's it, I'm doing this from now on'...

The ever-elusive 'trigger' for the younger generation tended to be a sore point for many informants, who lamented the current lack of youth interest in astronomy whilst recalling with great enthusiasm and fondness their own 'astronomical epiphanies', framed within historically-contextualised stories of family members and the days of their youth, as the following selections from my interview transcripts illustrate:

**Harold:** "Basically my father was interested because his mother was into comets. And my grandmother got them into looking at comets, so she used to show the kids the night sky, so it was from what he could remember, one of my earliest memories was a comet back in, whew back in 1948...a pretty early memory, and he had a mild interest...so there was the comet of 1948, and there was an eclipse, and I saw that one from Omaru, I was six years old, then we moved up here in 1952...there was a solar eclipse in, I remember it exactly, it was the 9<sup>th</sup> of June 1956, and 'click', that was it..."

**Brad:** "I trace it back to when I was eight years old, my memories a bit unclear, I got interested in the school library...I was born in the United States and grew up there, I looked up lots of books on it...two things happened, the same time my father brought a small telescope for the kids...and the other things I remember, that may have been a contributing factor is when I seven years old, my parents waking me up to see Alan Sheppard being blasted into space, cause he was the first American to do a sub-orbital flight, so for me, to grow up in that time in the 60's, when the space race was on, I can trace it back to when I was about eight years old, I was just fascinated by the books, and the artists and drawings of what Jupiter and Venus looked like, and having a telescope that I could [use to] go out and look at things..."

**Jim:** "It was my mother actually, when I was about 10 or 11 years old, we were walking...I was living in Gisborne at the time, and we went down for a swim down the road...and on the way back, Mum looked up and said "look...there's the pot", and as soon as she said it, I recognised the pattern of the three stars at the bottom, and the handle, and the far star of the pot, and as soon as I saw it that was it, something went off in my head...I became absolutely obsessed overnight, and I just, yeah from that point on I read heaps of books, and went to astronomy meetings, and met astronomy friends, you know, local society members...that night, she just 'threw the switch' so to speak, and she [*laughs*], she now absolutely *bemoans* the fact that she got me into it, with all the equipment and things I've brought over the years... I'm not complaining though, it's amazing."

Given the relatively limited number of respondents interviewed for this thesis, I am hesitant to make any overt generalisations concerning the predictability of behaviour; however, it was apparent that my informants who had engaged with some form of ‘trigger’ at a younger age were inevitably the ones heavily involved in active observing, in contrast to other interviewees who had joined societies at an older age and were involved only with reading and meeting attendance. Likewise, there was a clear correlation between active observing and an ‘astronomical ethos’; this ‘ethos’ referring to the personal philosophies and attitudes concerning definitions of astronomy (see *Introduction*, page 10, section 3.1 for a detailed discussion) and the role of amateurs in the collaborative process.

### Amateur-Professional Collaboration

Amateur-professional collaboration was often cited by my informants as being a quintessential feature of amateur astronomy. Both local and international media commonly cite the role of amateurs in assisting with the tracking and discovery of astronomical phenomena such as comets, gamma-ray bursts<sup>64</sup>, extra-solar planets and variable stars<sup>65</sup> using direct observation, gravitational microlensing<sup>66</sup>, CCD<sup>67</sup> imaging, photoelectric photometry<sup>68</sup>, or infrared spectrography<sup>69</sup>. Of the many collaborative networks involving international amateur-professional groups, significant contributions by New Zealand astronomers are associated with MicroFUN (Microlensing Follow Up Network; photometric-based monitoring network based at Ohio State University), the CBA (Centre for Backyard Astrophysics, CCD (visual) and photometry network based at Columbia University), the joint Japan/New Zealand MOA initiative (Microlensing Observations in Astrophysics; dark matter, extra-solar planets, stellar atmospheres and gravitational microlensing, based at the Mt John Observatory in New Zealand), SALT (the South African Large Telescope, a New Zealand/South Africa/Polish/German and American partnership formed in 2000) and PLANET (Probing Lensing Anomalies NETwork, consisting of Dutch, South African, Australian, Croatian, French, New Zealand and Austrian astronomers) (Pockley, 2007:7). Similar internet-based amateur networks, such as *transitsearch.org*, also exist as on-line databases to further the study of gravitational microlensing events. Historical accounts of astronomy in New Zealand (Hearnshaw, 2004;

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<sup>64</sup> Sudden and frequent bursts of gamma-ray photons that are usually indicative of supernovae (exploding stars) and the formation of (theorised) black holes.

<sup>65</sup> Stars that vary in brightness due to changes in the stars physical composition or gravitational distortions caused by another star orbiting close by.

<sup>66</sup> A common technique for finding extra-solar planets. Under the theory of relativity, massive objects in space ‘bend’ and warp space due to their gravity. When an object such as a star moves between Earth and a background star, the light is subject to distortion and magnification (as through a ‘lens’). If a planet is orbiting the lensing star and intervenes in the light path it will typically decrease or increase the star’s brightness depending on geometry and alignment.

<sup>67</sup> Charge-Coupled Device. Small visual imaging detectors (cameras) affixed to a telescopic eyepiece for the purposes of imaging distant objects in visible and infrared wavelengths. CCD cameras are commonly used nowadays for their sensitivity to light (up to 70% more sensitive than standard digital cameras or photographic film).

<sup>68</sup> A method of observation that utilises photoelectric photometers to measure extremely weak starlight by gauging individual photons; often this is used for tracking and revealing information about binary star systems (two stars that orbit each other) that are otherwise undetectable to visual observation.

<sup>69</sup> The study of the light from an object, usually the light from a star. Light moves through space as either waves or particles and the distance between the ‘peaks’ of the light-wave constitute the light beams wavelength. Spectrometers spread light out into these wavelengths creating a spectra. The spectrum of specific astronomical objects reveals details such as composition, temperature, density, and motion (rotation, trajectory and speed).

Carter, 2005) typically highlight the contributions of notable amateurs such as Frank Bateson (1909-2007), an internationally acknowledged expert on variable stars, OBE recipient for services to astronomy and epithet of minor planet 2434 (discovered 1981) in honour of his work. Recently publicised findings in both international and New Zealand media include the discovery of extra-solar planet OGLE-2005-BLG-071 in 2006 by amateurs Grant Christie and Jennie McCormick, of the Stardome and Farmcove observatories in Auckland and Pakuranga, as a part of the MicroFUN project (*Law and Health Weekly*, 15 April 2006:45; Naeye and Aguirre, 2006:96-97)<sup>70</sup>.

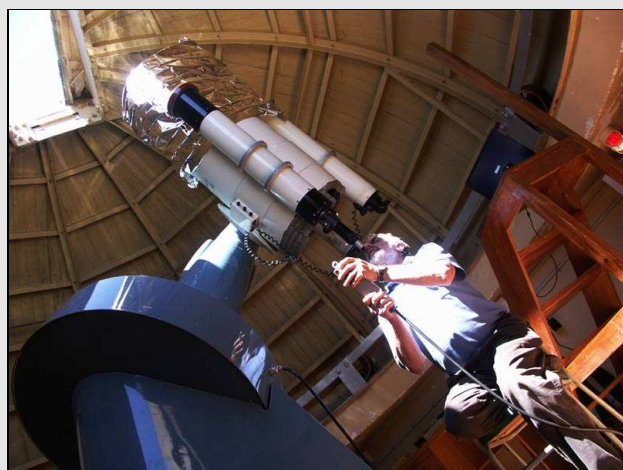


FIGURE 5. Wellington astronomer Gordon Hudson adjusting the Ruth Crisp telescope, testing the astrograph (used for astrophotography) on the sun. *Image Credit: Paul Moss*

The continuous coverage that can be provided by international amateur observations, and the ratio of amateurs to professionals (for example, estimates for the number of active amateur astronomers in the United States and Canada alone vary from 400,000 to as much as 800,000) mean that amateurs are an indispensable resource for professional astronomers worldwide. Some overseas professionals have taken the step of forming collaborative associations themselves; for example, the International Amateur-Professional Photoelectric Photometry (IAPPP)

and the Society for Astronomical Sciences (SAS)<sup>71</sup> serves as a means to broaden the channels of communication and encourage amateurs to interact directly with professional networks that rely on continuous coverage of the night sky as a response to a climate of increasing specialisation (Stephens, 2000:87; Mais, 2006:90)<sup>72</sup>. Professional astronomers, it is said, “know more and more about less and less” due to the constraints on ‘large telescope time’ and the requirement to secure research grants (Stephens, 2000:87; *The Economist*, April 2000:77)<sup>73</sup>. As one informant who interacts regularly with professionals observed:

The great advantage [with amateurs] is they’re doing ‘small science’, 100% of the time...I’ve got my setup in the backyard, and can do that anytime I want to, whereas if you’re a professional astronomer, you know, you can’t just whip out your telescope anytime at all, you have to book time. The ‘real’ telescopes here, like at Mt John, you’ve got to share with other people, and of course, for ‘really big science’, you know, “if you want time on the Hubble man, you’ve got to compete for it!” [*laughs*]... and amateurs, well we don’t do the glamorous stuff, but you know, it doesn’t require big telescopes either.

<sup>70</sup> See also <http://www.farmcoveobs.co.nz/Microfun%20BLG071.htm> (last accessed 8 November, 2007)

<sup>71</sup> *Where Amateurs and Professionals Come Together*. *Sky and Telescope*. Cambridge: May 2006

<sup>72</sup> *Backyard Science: The IAPPP and the Amateur Astronomer*. *Sky and Telescope*. Cambridge: Dec 2000, Vol 100

<sup>73</sup> *Science and Technology: In Praise of Amateurs*. *The Economist*. London, Apr 29, 2000; Vol 35, Iss 8168 pg. 77

With one or two exceptions, all informants interviewed for this paper were engaged in some sort of regular professional-amateur collaboration. Most took the form of direct (visual or CCD assisted) observations of variable stars using telescopes situated in shared local observatories or home-made backyard observing stations, frequently equipped with computerised “go-to” servomotors that can automatically adjust and rotate the telescope to track fixed points in the sky without supervision. The information from these observations is calibrated through the use of data-processing software (typically freeware or shareware programs developed by other amateurs or professional developers: *Visual Spec*, *RegiStar*, *DarkGen* and *Iris* were a few examples mentioned) and transferred via email or FTP<sup>74</sup> to computer servers located at either professional observatories or universities.

When discussing their activities, informants were characteristically enthusiastic and proud of their role in the collaborative process, and New Zealand’s location in the southern hemisphere was frequently cited as a unique and positive attribute:

Yes definitely, it’s great to be a part of it all...my part is that I’m a longer [range] visual observer. I have a CCD camera, and I do photometry of variable stars for the Centre for Backyard Physics which is a project at Columbia University...[they’ve got] a network of observers all around the world, and we’ve got a few in New Zealand....I’ve also been involved a lot with [the MOA] project...there are these big telescopes and they’re monitoring thousands of stars toward the centre of the galaxy...and when they see a star increasing in brightness, they know it’s not a variable star, they know it’s a case of gravitational microlensing, so [they’ve] got me using my telescope to contribute to that series of observations...I mean, New Zealand’s unique in that...you’ve got Chile, South America, New Zealand, Australia, South Africa, and that’s pretty much it for the Southern hemisphere. And the thing is, and this thing is right overhead, the centre of the galaxy is right overhead, for the Northern Hemisphere the galaxy centre is on the horizon or just below...with the prestige of having this thing overhead comes the responsibility of doing something about it....do the reports, get the photos ready, send them over to universities in the [United] States, and they go through it and look at the star, and they have really sophisticated software, and they can work out the brightness, and work out the upcoming gravitational microlensing event, and that little blip could be a [extrasolar] planet there...and they can use our images from New Zealand to work out quite a lot of information about it.

Likewise, New Zealand as a research location was seen as conducive to promoting information exchange; several informants specifically pointed to what they perceived as a supportive relationship between professionals and amateurs in New Zealand compared to other countries:

In New Zealand there’s always been a closer link between the professional astronomers and the amateur, because in part, of our relatively small size...the Royal Astronomical Society conference is a bit of a strange one because it’s not just an amateur or a professional outfit, it’s got both amateurs and professionals involved...and it’s even surprised our Australian counterparts in the level of exchange and

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<sup>74</sup> *File Transfer Protocol*. Used to transfer blocks of data directly from one computer to another computer’s server or database via the internet.

co-operation between amateurs and professionals in coming together for research...they can't quite believe it, I think, because they have problems over there with amateurs not getting access to resources that professionals have, or being able to assist in the same way we can.

Part of this collaborative satisfaction in New Zealand undoubtedly derives from informants' subscription to various astronomy-related international periodicals. Examples of breakdowns in amateur-professional relationships occasionally crop up in popular publications such as *Sky and Telescope*, *Amateur Astronomer*, and *Astronomy* magazine (although these are generally outweighed by stories of collaborative success). In these cases, the most common complaints by professionals involve false alarms by amateurs that lead to a waste of precious 'telescope time' (Allman, 1988:54). Amateurs on the other hand, commonly object to the lack of reimbursement for contributed resources such as storage devices containing data or postal charges, and failure to recognise their contributions in scientific papers (*The Economist*, April 29, 2000:78). Perhaps the most public display of these tensions emerged with the demise of the United States HST (Hubble Space Telescope) Amateur Program in the mid 1990's, partially attributed to amateur participants' lack of knowledge in formulating professional scientific proposals, ignorance of internal procedures and a lack of ability to analyse complex data without the assistance from professional astronomers (O'Meara, 1997:97-102). On reflection, informants were quick to draw comparisons between what they saw as 'institutionalised' astronomy and the role of the amateur as the 'man on the street':

Here...the custodians of the observatory up at Mt John for example, without fail you'll see them up there on public [education] nights when we have them...and they'll talk to *anybody*...they're not locked away somewhere or doing things in different circles. And a part of that...It's just the attitude we have here toward the bigger picture, that you *can* work together...and it's recognised, that to get things done you have to exchange information freely and not try to compete for things, "he discovered that" or having your name in a journal...Having a career is fine, but just...it's not done at the expense of other peoples work, which is the problem you get in other [countries] where the amateurs will do all the work, and when the results are published in a journal somewhere there's just no mention of the work the people out there putting in the hours did for them...so doing astronomy in New Zealand...it's one of the better places in the world to do it, because you actually get the chance to talk to professionals, as equals.

The emphasis on having one's findings published was an additional theme that emerged in conversation, both as a personal, goal-oriented intrinsic motivation ("after all," as one informant told me during an evening of observing, "despite the odds [of finding something unique] you've got to have *something* to keep you out here at 3am in the morning...") and a means to 'share the wealth' of knowledge accumulated through astronomical observation:

As an amateur you can make a small discovery, a small comet or some other thing for example, and you know people who are connected to other people, a few names come to mind...and even if you don't know them you can pass the information to this person and they'll have direct ties to professional astronomers in a certain area who can take the information straight to the astronomical union after they've checked it out

themselves...and as the person who initially brought it to their attention, you know that you'll be credited with the find and get your name on it...you don't get that anywhere else I don't think.

The publication of research findings also played a role in narratives of personal development within the context of astronomy. Informants' recollections and anecdotes of their first engagement with 'real science' were habitually framed as quantifiable results in the form of printed acknowledgement and achievement:

I was a mad keen astronomer by the time I was sixteen...it was a major impact on my life because I met Albert Jones<sup>75</sup>, and he gave me some star charts, and...I was over in Golden Bay observing variable stars at the time, and sending them to Albert [Jones], and he sent them through to Frank Bateson. But at that time, by the time I started with the group at sixteen, I had already worked with larger telescopes, and I'd done a science project back in the States on astrophotography, and did my first real science observation. I was already a subscriber to *Sky and Telescope*, and I've been a subscriber since about 1969... my first [research] observations were of the Perseid Meteor Shower, and they asked people to go out and count the number of meteors coming in, and I did that and sent the results through and I got my name in *Sky and Telescope*.

Acknowledgement was also construed as a means to level the playing field between professional and amateur contributions on both an individual and group level; an 'egalitarian ethic' that exemplified co-operation and served as a means to positively reinforce participation:

A while ago, the Canterbury Astronomical Society was able to borrow a GPS [Global Positioning System] unit and some telescopic equipment, a few add-on's and things, and members of the society actually got involved in observing a star as a part of [an international] programme, it was just some minor work but...I saw a journal article a few months ago on the project and it dawned on me that there are hundreds of people all involved in that. Here is this professional outfit recruiting all these people to assist with finding new things...and the article had *all* the names of the people involved, they were all published as having contributed to the research...it was simply brilliant to see them all in print. And for me...that was my five minutes of fame.

While being publicly acknowledged in print was seen as a desirable outcome, the most sought-after acknowledgement of one's contributions, and one that serves to mirror those handed out at a professional level, are the accolades and prizes available for amateurs who have made significant contributions to the science of astronomy. The most well-known in New Zealand is the Murray Geddes Memorial Prize<sup>76</sup>, which has been awarded annually by the Royal Astronomical Society of New Zealand since 1945. The Astronomical Society of the Pacific, which comprises various sections from Australasia and the Pacific

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<sup>75</sup> Albert Jones (b. 1920), along with Frank Bateson, is recognised as one of the most prolific contributors (approximately 13,000 visual observations annually) to amateur and professional astronomy in New Zealand. He is most commonly associated with the co-discovery of supernova 1987A in the Large Magellanic Cloud. (Hearnshaw, 2004)

<sup>76</sup> Recent recipients of the Murray Geddes Memorial Prize are listed on the site as being: 2000 - Mrs P A and Mr B R Loader; 2001 - Mr D Goodman; 2002 - Ms Marilyn Head; 2003 - Mr M Bos; 2004/5 - Dr Albert and Mrs Carolyn Jones; 2006 - Ms Jennie McCormick; 2007 - Mr R Rea. Source: <http://www.rasnz.org.nz/InfoForm/MurrayGeddes.htm>; (last accessed 10 April 2008)

Islands, awards two prizes for amateur contributions; the Amateur Achievement Award of the Astronomical Society of the Pacific<sup>77</sup> (since 1979) and the Klumpke-Roberts Award of the Astronomical Society of the Pacific, which recognises “outstanding contributions to the public understanding and appreciation of astronomy.”<sup>78</sup> The oldest accolade available to recognise the assistance provided by amateurs is the Jackson-Gwilt Medal of Britain’s Royal Astronomical Society, which has been conferred since 1897 for the “invention, improvement, or development of astronomical instrumentation or techniques; for achievement in observational astronomy; or for achievement in research into the history of astronomy.”<sup>79</sup> Given New Zealand’s relatively small population, many informants had had direct contact with award recipients at some point in their ‘career’; whether through personal friendships, as collaborative partners or simply as an audience member present at the function where winners were announced. However, despite the chance to personally ‘stamp’ one’s mark by discovering something significant or gaining recognition as a prolific contributor, personal goals were seen as necessarily subordinate to a ‘bigger picture’: the acquisition of knowledge and the doing of authentic science. Informant Barry explained his perspective on the matter of contribution:

I’ve been a member of the Royal Astronomical Society since 1972...the Royal Astronomical Society [had an] emphasis on the doing of science by amateurs, and so that’s how I got involved, in variable star observing, that’s amateur collaboration, you know we do the observations, and send it off to the professionals, and there’s other sections that observe meteors and so forth, so yeah, there is a lot of that heritage in New Zealand with the Royal Astronomical Society...the great thing about visual observing...it’s an amateur [thing], I mean there aren’t that many professional astronomers in New Zealand. And they are there, and they’ll come to the meetings and stuff, but around 90% are amateurs, but we’re amateurs who are doing real science, and that’s the really important thing, you’ve got to be out there actually *doing* stuff, because without it, you’re getting nowhere.

This focus on “doing stuff” was a recurrent theme in the many discussions I had with practical observers, though the repetition of the idea was not limited to personal views expressed between respondent and interviewer. Many editorials and articles in astronomical society publications detail the trials of engaging in the collaborative process from an amateur point of view, and on occasion embed them within larger themes of contributive participation and the expansion of human knowledge. For example, one such article from the Stardome (Auckland) Observatory’s annual publication *The New Zealand Astronomical Yearbook*, describes the typical routine of Auckland astronomer Jennie McCormick in setting up and making observations in the name of ‘a contribution to science’:

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<sup>77</sup> The *Amateur Achievement Award* consists of \$500 and a commemorative plaque, which is presented at the Annual Meeting Awards Banquet. Source: <http://www.astrosociety.org/membership/awards/amateur.html> (last accessed 10 April 2008)

<sup>78</sup> The contributions may be in the form of popular books and articles; lectures; radio, TV or movie productions; or service to public education in astronomy of any other nature. The award consists of \$500 and a plaque to be presented at the Annual Meeting Awards Banquet. Source: <http://www.astrosociety.org/membership/awards/klumpke.html>; (last accessed 10 April 2008)

<sup>79</sup> Source: [http://www.ras.org.uk/html/ras\\_pdfprize.html](http://www.ras.org.uk/html/ras_pdfprize.html); (last accessed 12 April 2008) As mentioned previously, variable star observer and New Zealand resident Frank Bateson received this award from the Royal Society in 1960.



### *A Contribution to Science*

A typical observational evening starts with my drive home from work. The long queues of traffic give me time to check the sky, to note what the weather is doing, which way the cloud is moving, and wonder if the weather is going to co-operate and allow a long run...

Our interest is in Cataclysmic Variable Stars...Our job is to monitor these changes and send all observational data to the Centre for Backyard Astrophysics...We built an observatory in our backyard; in fact, the observatory sits two metres from our lounge, making access very easy...a way of making a worthwhile contribution to the science of astronomy in our spare time.

As twilight approaches and the weather looks promising, we open the shutter on the observatory dome to allow time for the observatory temperature to become equal or close to the outside temperature. This also allows the primary mirror on the telescope time to cool nicely. Inside the observatory, the computer we use to run the telescope, the CCD and the time server is powered up.

We choose to use a program called 'The Sky'. It is excellent for accurate telescope control...The assigned target star is found on 'The Sky' and the telescope is told to "GO TO"...With the use of a computer program called *CCD Ops* we take a 3 second image of our target star field; this is to gauge whether the telescope is in need of focusing and that we are indeed pointing at the right star...It's now time to get down to work.

As soon as the first rays of sunlight illuminate the eastern horizon or our observations are disrupted by cloud, our night of photon counting has come to an end. The next task – collating the collected data and reducing it in a software program called *Munidos* – is normally carried out early the next evening and sent by email to the CBA [Centre for Backyard Astrophysics] for analysis. If we are lucky, a scientific paper may be put together using the data we have obtained...

We have come a long way since our observatory was built...We can make worthwhile contributions to science without PhDs. We still have a great deal to learn about these wondrous stars. But that's what it's all about (McCormick, 2001).

### Practicals and Armchairs: contribution and consumption

So far I have been concerned with describing the structure of the New Zealand astronomical community, and the role of amateurs in the collaborative process. This process, while beneficial to the wider professional community, also serves to reaffirm amateurs' personal philosophies of what "astronomy", as both definition and action, entails. Accolades that are given in recognition of contributions to astronomy assist in this reaffirmation, but in another sense, they also provide tangible public guidelines for behaviour that emulate the values of specialisation intrinsic to the study of astronomy at a professional level. And this emulation highlights one critical feature of the collaborative process; one can only gain accolades, or partake in these value systems, if they *contribute*, and one can only contribute if they are a *contributor*.

Groups and communities commonly make a distinction between those who are 'insiders' and those who are 'outsiders'. In this case, 'insiders' - astronomical society members and the professionals with whom they interact – are distinguished from the 'outsiders', composed of non-members and the general public. Likewise, while insiders are made up of participants whose astronomical activities vary to differing degrees, from the perspective of outsiders, all are 'astronomers' by association. To this effect, the following discussion deals with the concept of *differentiation*: first, how the creation of categories by insiders defines *who* is a contributor and *what defines* contribution, relevant to specific historical, social and cultural influences. Secondly, how the creation of categories that differentiate one group from another form the basis for attempts to *morally regulate* behaviours that are seen as congruent with an 'ethic' of contributive participation.

This distinction between the two 'types' of astronomer was previously touched upon in the introduction to this paper; however, its importance to informants as a means to contextualise one's own place in the society structure goes beyond simple demarcation. Whilst providing a label that enables outsiders, the general public or the newly-inducted to identify those most likely to be involved in collaborative ventures, the distinction carries with it a number of significant connotations related to the formation and assertion of identity, personal values and philosophies that extend beyond the immediate social sphere of the society organisation. Informants such as Michael neatly summarised the categorical distinction by stating the following:

Okay, there's two types [of astronomer]...on the one side you've got the practicals, the 'hands on' people, and they love getting it right with the telescope, finding things, and these are the types of people who build their own telescopes, and grind their own mirrors, really good telescopes and equipment, and they're actually going out and doing things, getting out and observing everything and collecting data and stuff...and the other group, they're the 'academic' group or the 'armchairs' we call them, and they like going to talks, going to meetings, looking on the internet, going to websites, reading books and articles from NASA.

Douglas, a self-confessed ‘armchair’, stated that: “Yeah, there’s...definitely two groups...the academics, the ‘armchairs’ I mean...and the ‘practicals’, and personally, I fall into the academic or the ‘armchair’ crowd. So when we’re out on a working bee, fixing some problem at the observatory, the practicals are out building something with a hammer you know, and me and the other guys, the academics, we’re just standing around discussing ‘what’s the best method for drilling a hole’ or something like that [laughs]...and when you go to Stardate, you can clearly put people into two groups like that, it’s easy to pick them out...” The humour implicit in Douglas’s description was in keeping with a generally relaxed attitude to his involvement and participation in society activities. Other informants however were highly conscious of their monitoring and appraisal by others in the group, and found the distinction mildly unfavourable:<sup>80</sup>

Yeah...well not everybody can have [access to] a proper observatory with all the scopes and things...if I brought a [big] telescope I don’t think I’d get the use out of it. It’s all very well for some...I fall more into the category of the ‘armchair’ astronomer you know, or the ‘internet’ astronomer...I mean, there was a big aurora on the news, I didn’t get out to see it ‘cause it, it was in the South Island, but I got [to see] some photos of it [that others had taken], which is fine you know...

The ‘armchair’ distinction is not a recent linguistic invention, nor is it exclusive to astronomy. Stebbins (1979), in a study of amateur archaeology, notes that the ‘armchair archaeologists’ spend the majority of their time reading “society newsletters and periodicals from related publications such as *Natural History*, *American Anthropologist*, or the *Smithsonian*.” “Reading,” Stebbins suggests, “is the main way they have of educating themselves [as] virtually none of them have a university degree in archaeology...Books, periodicals...and attending meetings constitute the main forms of acquiring knowledge” (1979:134-135). Indeed, many attendees at astronomical society meetings are happy to simply show up, listen to the lectures and discuss recently read articles or theories with like-minded members: in effect, many utilise the meeting environment as a social tool for sharing ideas and renewing acquaintances. Additionally, as paying members, they contribute financially to group activities and the procurement of resources which enable the maintenance of observatories for the benefit of affiliates and the general public.<sup>81</sup>

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<sup>80</sup> This warrants a couple of brief points: (1) Based on my observations of society meetings, ‘armchairs’ tended to make up the majority of attendees, although this did not necessarily mean that discussions or lectures on active observing were absent. The mechanics involved in practical astronomy, photometry, spectroscopy and radio astronomy are, for the armchairs, still an integral aspect of the experience given that the theoretical features of cosmology depend, in part, on empirical observation and scientific method; (2) I did not get the impression that the creation of these internal categories necessitated a form of antagonism between one ‘type’ and the other, and during meetings there was no overt indication of any condescension or pretentiousness on the part of active observers toward those just there to listen. While some respondents have expressed private frustration at the lack of practical observers in their society, I would suggest that this frustration stems from a conscious appraisal of declining membership in their particular group that may lead to the society going into recess, and an awareness that practical observers are likely to be more passionate about retaining their place in the group.

<sup>81</sup> Hence one can see why some categorised as an ‘armchair’ astronomer may view the classification in a negative light.

When asked about the role that local societies play in ‘mediating’<sup>82</sup> between the two ‘types’ of astronomer, one respondent commented that when running a meeting, “there’s twelve months of meetings, and you’ve got try to get a good practical speaker [to] come down who can see and do things, and you’ve also got to have other things like cosmology, theoretical kind of stuff...you’ve got to learn about maths and physics, a range of different subjects, and events and workshops to cater for different people, a balance of 50/50 throughout the year...if the *whole* year was practical things then the academics wouldn’t be too happy, and vice-versa, the practical people wouldn’t be too happy if it was all theoretical stuff...so I try to put together a little [of] both sorts of things in it to cater to both [groups]...”<sup>83</sup>

While the categorisation of the two ‘archetypes’ tended to be a casual observation, occasionally even laced with humour when classifying oneself as one or the other, when discussions turned to the *role* one felt they played in the New Zealand astronomical community in general, informants typically responded in ways that reflected a more serious attitude. The importance of active observing was emphasised by one of my informants, Harold, who argued that there was a causal link between individual action, knowledge acquisition and ‘setting an example’ in the hope that it would

“encourage people and [see] results themselves...I hope that will trigger more people to go out and [get an] interest in scientific observing...to actually make discoveries...to try and lead to genuine results...to get the feeling that, ‘the human race now has this bit of knowledge because of something *you* did’. Not just sitting there and *reading* about it.” However, this task was also commonly cited as ‘easier said than done’. Society president Mark, chair of a smaller group located in the central North Island, was disappointed that his recent attempt to stimulate interest in active observing among his particular “bunch” was unsuccessful:

I organised a special night for members, and we would have gotten the telescopes out and everything, but the majority [of members] that showed up were only interested in the intellectual side of it...the ‘armchair astronomers’ you know...and so, like the people at the meeting last night, they’ll come along to listen to an



FIGURE 6. Hawera Observatory, King Edward Park, Hawera.

<sup>82</sup> In hindsight, ‘mediate’ was definitely the *wrong* choice of term, and my initial attempt at this inquiry was badly phrased; consequently, it came as no surprise that one informant retorted with the statement/question: “armchairs *versus* practicals...is that what you mean?” Subsequent questioning along these lines was re-worded to eliminate any confusion.

<sup>83</sup> Likewise, society newsletters sent out in advance of the monthly assembly will characteristically divide information into sections applicable to members’ areas of interest that, to some degree, parallel the meeting format itself: (a) a welcome message or editorial from the society president, (b) general notices and announcements regarding planned outings or star parties, (c) ‘special interest’ sections which may comprise book reviews or a guest article on black holes, galaxy formation or quantum physics; for example, a section outlining the phases of the moon, seasonal equinoxes, conjunctions and occultations, predicted meteor showers and the positions of stars or constellations in the sky for that month.

interesting talk or whatever, but they're not ambitious enough to get a telescope and get out there and observe, they're more interested from an intellectual point of view.<sup>84</sup>

Likewise, another respondent involved in collaborative cometography voiced his frustration that the majority of members at his local society were only interested in what he deemed “whiz bang” astronomy, by which he meant the cosmology popularised by books such as Stephen Hawking’s *A Brief History of Time* (1988, 1991) and *The Universe in a Nutshell* (2001):

One thing that annoys me a bit is that...everybody seems to be mad keen on going on about black holes these days!...I'm not a cosmologist, I had a friend, he said he's not interested in cosmology because he's got no interest in science fiction [laughs]...I mean, you have the armchairs, and the first thing they go on about is black holes...well...I don't know peanuts about black holes, it's not my field, that's way the heck out in the back of the field...I'm interested enough in what I can actually *see* in the solar system...

The general consensus from my active informants was that observation, data collection and the collaborative process was not only a principal goal of amateur astronomy (see also the introduction to this paper regarding common definitions proffered for ‘astronomy’), but at an individual level represented a personal responsibility to contribute new information for the purposes of furthering scientific knowledge, a sentiment echoed in Jennie McCormack’s ‘A Contribution to Science’ mentioned previously. Informant Mark, who had earlier expressed some dismay at the lack of interest among his peers, surmised his approach as follows:

[I've got] a bit of training in photometry...you can actually get numbers, you can actually do science, you can actually see results [and] make discoveries...[through] photometry I've made one or two discoveries, which are quite minor, but they were discovered through things I'd actually done myself...you can actually get information, you can extend human knowledge by what you do... getting out and observing, getting your data yourself...even if you're freezing half to death, you've got to be prepared to do it to get some kind of result.

At this point, the role of amateur-professional collaboration becomes particularly important. During an informal, post-meeting chat with a society member, he made the observation that the data gathered by the multitude of observers around the world “amounted to nothing on its own.” Without being ‘filtered’ through a professional framework - within which systems of peer review, discussion and dissection intertwine with computational and telescopic resources - knowledge acquisition, a “ripple in a pond that

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<sup>84</sup> One aspect of the practical/armchair distinction that warrants a brief mention is that for one to be classified as ‘active’, one must be *prolific* in their contribution. Those members that go out ‘occasionally’ to observe will, for all intents and purposes, still be classified as an ‘armchair’. However, the lack of ‘presence’ with regular observing groups (which will be discussed in detail later in this chapter) does not necessitate one being classed as an ‘armchair’; for example, Robert Rea of Nelson, who received the *Murray-Geddes Prize* from the RASNZ for contributions to astronomy in 2007, or Nelson astronomer Frank Bateson (d. 2007) who received numerous awards, are both ‘solo’ practicals with many years of collaboration and contribution to their name. In both cases, recognition of their prolific contributions (and classification as ‘practicals’) are served through the public bestowment of accolades.

finds its way back to the shoreline after you've thrown your stone"<sup>85</sup>, cannot occur (see *Figure 7*). In this respect, the attitude of 'practicals' toward those that do not actively participate – the 'armchair astronomers' – is one comprised of a distinction between *knowledge production* – having a role in the process of active contribution – versus *passive consumption*.

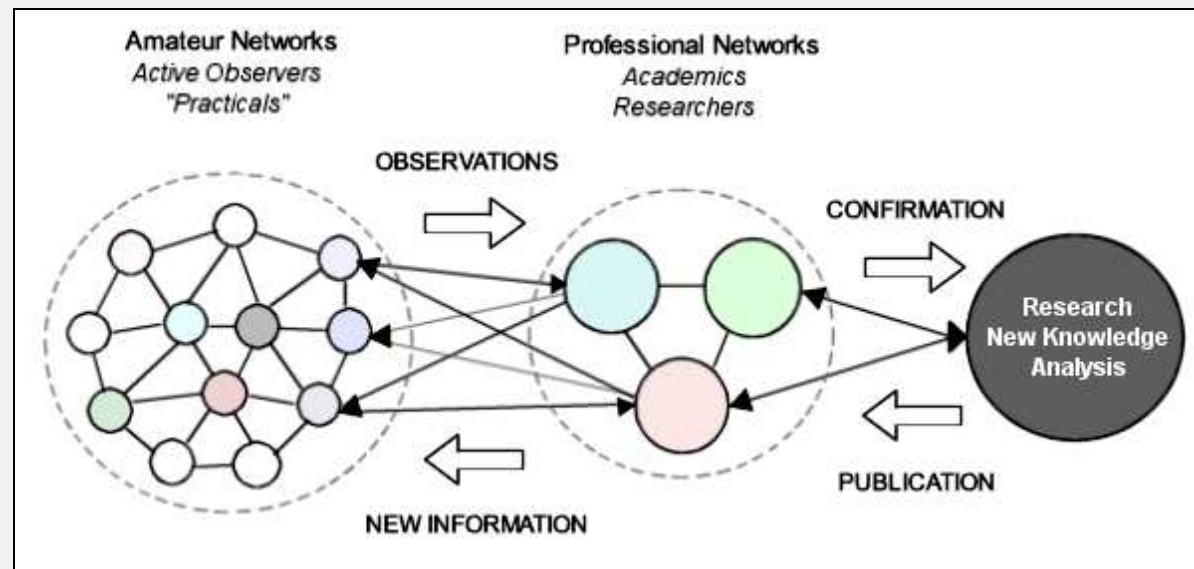


FIGURE 7. Active observing networks, which include informal groups and observatories (both society-operated or privately owned by individual members), liaise with professionals who act as gatekeepers for assembling, interpreting and presenting the summarised findings of amateur contributions back to both the academic and amateur astronomical communities.

Here, 'passive consumption' is defined in opposition to production, but is also defined in opposition to *active consumption*<sup>86</sup>, or the ability to make critical assessments of commodities – telescopes, computers, participation in an activity or the effort expended in acquiring specific information – before they are appropriated. Simply, they must be seen as serving the needs of a broader collaborative process that contributes to the production of scientific knowledge. To this effect, the 'armchair' distinction<sup>87</sup> is best understood as one of *conflation* with passive consumerism, a point that Löfgren (1994) notes in his citation of Bourdieu when observing that "...the life histories of intellectuals are characterised by an obsession with questions of distinction and taste, [manifesting as] a recurrent need to distance oneself from other consumers...to stress one's role as a critical observer of the consumption habits of 'the others'" (Löfgren,

<sup>85</sup> I am indebted to that particular society member (whose name I cannot recall) for this gem of an analogy!

<sup>86</sup> Some suggest that 'active' consumption should be recognised as an organised socially reproductive act ensuring continued production. Writing on material consumption and culture, Friedman (1994:15-16) notes that while "in material terms consumption is the passive *last* stage of the reproductive process, in social terms it is the origin of a specific structure of demand." The 'demand' in this instance is, as mentioned, conflated with the production of knowledge categories relevant to the interests of my informants.

<sup>87</sup> I should point out that the emphasis placed on active observing is not, I would suggest, simply a case of attempting to recruit new members for the sake of 'making up numbers'. While some groups do go into recess, this is mainly due to factors such as local geography and population density rather than any lack of fervent interest; 'armchair' astronomers, like their practical counterparts, allow the group to exist by paying their annual club dues, showing up to meetings and having a say in committee matters.

1994:55). The “others”, it is suggested, are the ‘working or aspiring middle-class’ who are dependant on forms of directed consumption that constitute a passive “weakening of the self”<sup>88</sup> emblematic of vulgar commercialism (Friedman, 1994:182; Miller, 1994:93; Roberts, 2006:198).<sup>89</sup> This distinction is not something new however; Weber’s (1921 [1978]) sociologies of religion make frequent reference to a ‘heroic ethic’ and an ‘ethic of the mean’, reflecting a division between those that adhere to ‘intellectual honesty’ as opposed to a habitual ‘self-deception’: “[The] ‘heroic’ ethic...imposes on men demands of principle to which they are generally *not* able to do justice, except at the high point of their lives, but which serve as sign posts pointing the way for men’s endless *striving*. Or there is the ‘ethic of the mean’, [those] content to accept man’s ‘everyday nature’ as setting a maximum for the demands which can be made” (Weber, 1978:385-86 [his emphasis] cited in Rojek, 1985:65). For Weber, the scientist exemplifies, and lives by the heroic ethic, and in doing so “shakes a fist at the essential meaninglessness of human existence” in a world of increasing contradiction and ambiguity. Conversely, the majority subscribe to an ‘ethic of the mean’<sup>90</sup>, content to surrender to “habitual work and leisure relations” that “conform to the requirements of a merely mundane existence” (Rojek, 1985:65).

### Performance and Moral Regulation

The preceding accounts of amateur-professional collaboration and the creation of internal categories raise two points. First, as noted in the preceding discussion of astronomical societies and their members, participants operate within a framework guided by an emulation of professional standards. Second, the act of creating distinctions within this framework involves enacting behaviours that are congruent with the category the distinction implies. In this sense, amateurs engage in a *network of performances*, or, the series of actions – the collaborative process and active observing - in which participants engage in the sphere of

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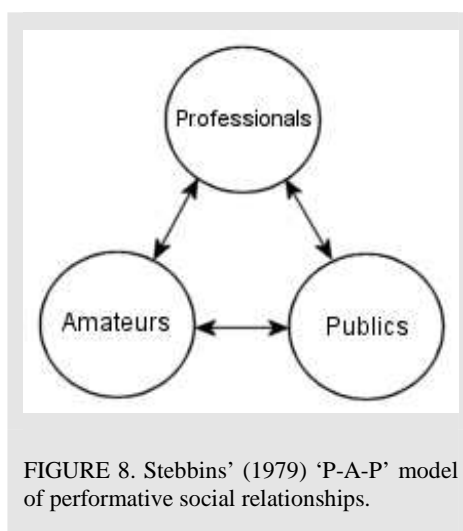
<sup>88</sup> Roberts (2006:198), in noting the capitalist context of contemporary leisure, suggests that modern trends toward commercial leisure activity creates “endless insatiable desires that leave people unfulfilled and restless...turning people into passive receptacles of entertainment to which no critical response is possible.” Kelly and Godbey (1992) on the other hand, make the case that the ‘freedom to choose’ one’s activities in contemporary society is freedom “without the comfort of theological and ethical systems” of modernity; to this effect “people reject freedom at an individual level during their leisure” as a means of regularity and security in social life (Kelly and Godbey, 1992:502).

<sup>89</sup> It can be taken as axiomatic that contemporary attitudes to consumption are historically constituted, and find their origins in the economic philosophies espoused by those such as Adam Smith’s (1776) psychological naturalism (people’s ‘natural desire’ for self-improvement); Jeremy Bentham’s (1748-1832) concept of individual ‘happiness’ as a quantifiable commodity (the lack of money being ‘the source of misery’) that could be equated to the common good of society; or John Stuart Mill’s (1859) famous maxim that “over his own body and mind the individual is sovereign”, the basis for many early twentieth-century economic policies concerning the individual’s “right” to preference satisfaction in the face of aggressive marketing (Hope, 1995:829; Harrison, 1995:85-88; Skorupski, 1995:566-569). Above all, the fundamental idea is a simple one: the labour involved in production brings the individual monetary and spiritual rewards, in turn stabilising society as a whole. Those that do not work lack the ‘natural’ drive for self-development; give back nothing, and remain on the periphery of society as ‘doomed to consume’.

<sup>90</sup> On this note especially, Rojek (1995) observes that early modernity conceived of recreation as a functional conduit toward a rational goal. Activities that are today conflated with ‘passive’ consumption, such as reading books or visiting holiday spots, were perceived as necessary to improve one’s self for the betterment of society. The antithesis to this virtuous use of one’s time were activities construed as lacking in ‘application, energy and willpower’; namely, drinking, gambling, idleness and sloth - itself as “equally degrading to individuals as to nations...Sloth never made its mark on the world...Sloth never climbed a hill, nor overcame a difficulty it could avoid...[idleness] always failed in life, and always will. It is in the nature of things that it should not succeed in anything. It is a burden, an incumbrance and a nuisance – always useless, complaining, melancholy and miserable.” (Smiles, 1894:90 cited in Rojek, 1995:91; Kelly and Godbey, 1992)

their social relations to assert, reinforce and perpetuate an identity based on the distinctions they create. Rojek (2000:16) suggests that “to be noticed in modern industrial-urban culture we must be adept ‘performers’...leisure is often presented as the antithesis of performative culture. It is not.” The term *performance* as used here draws on Erving Goffman’s (1957, 1974) dramaturgical metaphor for the ‘presentation of self’, in which “the individual manages his speech, body, demeanour and attire and other communicative symbols to present an image/impression to others [that is] designed to elicit a preconceived interpretation of the self from a presumed audience” (Kelly, 1983:100). Social interaction within leisure spaces is likened to a “setting for a mini-drama with interactive performances” in which “different actors take the same part in different ways” (Kelly and Godbey, 1992:323).

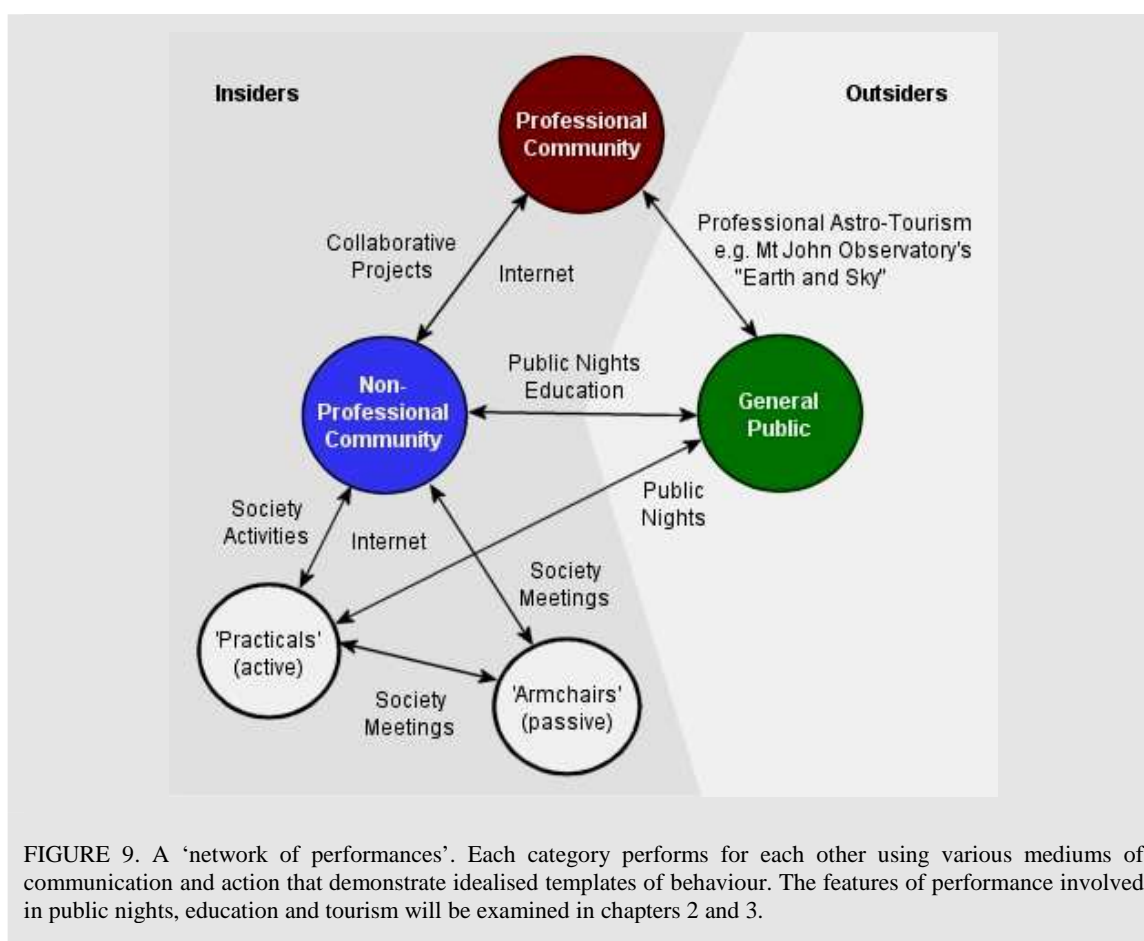
Before proceeding, it is important to clarify what I mean by the term ‘network of performances’. Robert Stebbins’ examination of ‘serious leisure’ (1979) suggests a set of social worlds comprising professionals, amateurs and ‘publics’ (PAP) (see *Figure 8*); these groups function interdependently to provide mutually beneficial knowledge, discussion, criticism, creative support and occasional material or financial assistance. In addition to emulating the organisational standards of their professional counterparts, amateurs often provide educational services to the general public, drawing on the latest research and occasionally supplementing their lectures with the use of professional equipment or resources<sup>91</sup> (Stebbins, 1979: 26, 29-32). In the case of amateur-professional collaboration, data obtained by amateurs is appraised by professionals who subsequently provide validation of the amateurs’ ability to collate and successfully channel the information obtained in a method befitting the professional standards they seek to emulate.



<sup>91</sup> For example, the use of a research telescope at an observatory outside of professional ‘telescope time’. Additionally, benefits may take other forms: financial remuneration via donations, or free labour for assistance with building projects (the restoration or upkeep of a local observatory).



Under Stebbins' model, *publics* is a dynamic category that usually consists of the lay population, but may also comprise amateurs and professionals in situations where these groups 'perform' for one another (for example, giving a lecture at a society meeting or collaborating on scientific projects) and provide feedback indicative of the relative degree of success or failure of the medium of communication. While Stebbins' PAP model is useful, having been adapted by various other researchers investigating mutual interdependence in leisure relationships (for instance, Yoder [1997], analysing consumption among amateur tournament fishermen substitutes 'professionals' with 'commodity agents'), it nonetheless lacks a tenable exploration of the dynamic context of performance, opting for homogenous categories that negate the presence of internal distinctions within social worlds. For this reason, I use the term *network of performances* (see Figure 9) to encompass the range of social interactions occurring between categories, especially those implicit in the creation of internal distinctions ('practical' and 'armchair', 'active' and 'passive') that have an influence on *how* and *why* certain forms of performance are enacted (for example, amateur-professional collaboration as a 'performance' to augment a contributive ethic that reinforces distinctions within a social world).



As participants engage in performances within a vast network of organisational and social structures, it might be inferred that these may function as a constraining influence in shaping and directing action. However, recent sociological theories of agency (for example, Giddens. 1984, 1991; Rojek, 1995;

Stokowski, 1994; Kuentzel, 2000:90) suggest that traditional theories of social interaction are flawed in their proposition that behaviour is directed exclusively toward validating self-meaning. Giddens' (1984, 1990, 1991) theory of structuration<sup>92</sup> for instance suggests a 'mutual constitution' of agency and structure<sup>93</sup> that focuses on the ways in which patterns of human interaction provide continuity and in turn, reproduce social conditions (Stokowski, 1994:100).<sup>94</sup> The empirical task of this approach is to examine how people construct and maintain biographies and identities<sup>95</sup> out of the ongoing practices of everyday life (1990; Kuentzel, 2000:90, 91). For Giddens, identity serves as a heuristic device that contributes to the regularity of social interaction<sup>96</sup>; a "reflexive monitoring" that operates at a discursive level of consciousness and judges the effectiveness of actions in achieving their objective.<sup>97</sup> The implication is that this reflexive monitoring of the self can not only reproduce structure, but also *transform* it; and hence, contribute in some fashion to the transformation of society itself (Kuentzel, 2000:90; Stokowski, 1994:100-106; Giddens, 1990). While performances concerned with self-presentation may serve to reaffirm identity, performances within networks also provide 'templates of ideal action' that, when conflated with distinction and self-presentation, demonstrate attempts to transform social structure by *morally regulating behaviour*.

Theories of moral regulation (much like Antonio Gramsci's [1929-1935] concept of cultural hegemony<sup>98</sup>) examine how dominant institutions manipulate cultural sentiments and symbols to achieve compliance with a set of ideologies and values. The most familiar and visible form of moral regulation involves

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<sup>92</sup> Giddens' approach seeks to eschew other theories that prioritise the role of structure as a constraining force or the 'imperialism of individual experience' (Kuentzel, 2000:89) as deterministic factors that dominate social interaction. While Giddens acknowledges that structure *can* be constraining to actors, he thinks that many theorists have overstated the magnitude of structural constraints.

<sup>93</sup> *Structures* comprise rules and resources organised as properties of social systems. *Rules* are patterns people follow in social life. *Resources* are what are created by human action, and may comprise authoritative resources (that control persons themselves) or allocative resources (that control material objects). In structuration theory, there are three analytically distinct types of structure: *signification* (language, codes and interpretive schemes), *legitimation* (moral order via the naturalisation of societal norms, values and standards) and *domination* (the exercise of power through the control of resources). All three rely and borrow from the other (Stokowski, 1994:100-106; Giddens, 1990).

<sup>94</sup> Giddens proposes that the performances involved in interaction serve as a method of cultivating 'ontological security', a 'matrix within which individuals reflexively construct their self-definitions'. Simply phrased, this security is the 'trust' people have in social structures to adhere to some degree of predictability and stability. Thus the contemporary 'project of the self' is not self-improvement, or an attempt to resist the restrictions of organisational and social structure, but rather to 'maintain the narrative' in moments of ambiguity or 'ontological anxiety'.

<sup>95</sup> 'Identity' is defined by Kelly and Godbey (1992: 316) as "dynamic, continually revised and dialectical, a process of perpetual negotiation in response to enacted roles and the validation of these roles in the context of social interaction."

<sup>96</sup> Social interaction being "activity instantiated by the agent acting within the social system" (Stokowski, 1994:100-106; Giddens, 1990).

<sup>97</sup> Giddens' (1984, 1991) concept of 'discursive consciousness' warrants a brief explanation here. Structuration theory suggests two 'levels' of reflexive monitoring in social interaction (which I will summarise here for the sake of brevity). At one level, people monitor at a level of 'discursive consciousness', or, the "ability to give reasons for what one does, and the ability to attribute reasons behind other peoples actions...[for example] intentions, purposes, goals, needs and dispositions" (Kuentzel, 2000:89). At another, 'folk' level of monitoring is 'practical consciousness', or, what is simply 'done' – the elements of everyday interaction that "guide and interpret action, but which are rarely articulated" (Giddens, 1991:36 cited in Kuentzel, 2000:89). Simply put, the practical level of consciousness differs from the discursive level in that people do not "hold in mind" the majority of the content involved in their everyday interactions and circumstances, but could, if asked, articulate their 'folk knowledge' if required to do so (Kuentzel, 2000:90).

<sup>98</sup> Basically summarised, Gramsci's (1972 [1971]:12, 57) concept of hegemony is based on the aspiration of a social class to dominate the political, moral and intellectual spheres of civil society, through which it can then exercise direct control through the State.

legislation by the State prohibiting activities deemed to be detrimental to society<sup>99</sup>; for instance, drug use, prostitution, gambling and alcohol.<sup>100</sup> In addition, moral regulation may also appeal to nationalism and unification; for instance, the use of spectacle - parades, marches, sporting fixtures, national holidays or celebrations of cultural diversity - to create “a field of social vision” which downplays socio-economic and class differences within the nation, and open up a “rhetorical space for those who are ‘alien’ to participate in what is claimed to be the ‘national’ way of life” (Rojek, 1995:44)<sup>101</sup>. The application of this theory to leisure involves looking at the ways in which ruling elites facilitate national curriculum’s for self improvement.<sup>102</sup> For instance, where activities that are advantageous to commercial interests (for example, the taxation revenue generated from the sale of cigarettes and alcohol) are potentially detrimental to the populace, by granting pecuniary assistance for beneficial leisure activities, the State can directly manipulate ‘free time’ behaviour and perpetuate the regularity of particular forms of leisure identity, practice<sup>103</sup> and association while marginalising those that celebrate the values of peripheral cultures (Rojek, 1995:43, 44).<sup>104</sup> To this effect, other studies, such as those by Corrigan and Sayer (1985) and Roberts (1995) suggest that moral regulation attempts to naturalise historically and socially specific forms of conduct as universal. Where moral regulation is successful, subjects accept certain forms of identity, practice and association as ‘inevitable’ and reject other forms as ‘deviant’ or ‘impossible’. Strategically speaking then, moral regulation is concerned with *constructing normality*. But it is also, as noted by Rojek (1995:44), a movement from external constraint to self-discipline; by voluntarily keeping ourselves in order, morally and socially, “the moral and social order of [modern life] is cemented.”

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<sup>99</sup> The philosophical basis for this means of social control finds its roots in Western cosmology; early writings on the subject, such as those by Emile Durkheim, treat moral regulation as “inevitable for the functioning of society”, are in keeping with a Judeo-Christian cosmology that presents the human actor in society as “*homo duplex*, composed of two opposing natures, one governed by violent passions and the other by reason and sensibility...if regulation of behaviour is lacking, ‘nothing remains but individual appetites, and they are by nature boundless and insatiable, if there is nothing to control them they will not be able to control themselves’” (Durkheim, [1950] 1992:11 cited in Ruonavaara, 1997:278).

<sup>100</sup> Charles H. Whitebread, writing in the *Southern California Law Review* (1999) on the prohibitory legislation of alcohol, gambling, prostitution and drugs notes that moral regulation “most often occurs when a social majority objects morally to the specific conduct, value system, or culture of others and imposes regulation upon them,” arguing that “social anxiety is, and always has been, the progenitor of prohibitions” (1999:362).

<sup>101</sup> For instance, the presence of historical figures on national currency (Kate Sheppard, Ernest Rutherford, Sir Edmund Hillary) appeal to New Zealand’s population as socially innovative, scientifically educated and hard-working achievers.

<sup>102</sup> Rojek (1995) points out that leisure has traditionally had strong connections with nationalism. In the sixteenth and seventeenth centuries, pastimes such as horsemanship, hunting, coursing, hawking, fowling, fishing, archery, fencing, dancing and music were the “accepted hallmarks of the gentleman”, traits that were later inculcated in nineteenth public school systems via organised sport and leisure that sought to instil ‘self-discipline and manliness’. In modern leisure, games, and sports such as soccer and rugby have been subsequently commercialised and used by industrialising elites to ‘instil discipline into the nation and to symbolise national unity’ (Rojek, 1995:71).

<sup>103</sup> One example of this form of social control involves the promotion of chess as a leisure activity by Soviet State authorities. The organisation of the first State chess Olympiad in 1920 played major role in developing Marxist programmes for chess playing and a State controlled-physical culture movement (Richards, 1965: 10, 17). Chess was seen as a potential weapon to strengthen the growth of intellectual culture amongst the peasant masses, to bring them closer to participation in the political struggle of the proletariat; a gateway through which the ordinary civilian might reach a deeper insight into cultural affairs, and come to see as ‘normal’ those attributes of intellectualism and ‘high culture’ that the authorities wished to associate as typical of the Soviet citizenry. “In our country, where the cultural level is comparatively low, where up to now a typical pastime of the masses has been brewing liquor, drunkenness and brawling...the chess movement is a part of the struggle for culture and [a] political weapon which cannot be ignored” (Krylenko, 1925 cited in Richards, 1965:39-40).

<sup>104</sup> A local example concerns The Sport and Recreation initiative (SPARC; 2002) which receives 70 million dollars annually for the promotion of “a nation inspired to be active, participate and win” (<http://www.sparc.org.nz>). The ‘Push Play’ campaign (a redesign of the original Hillary Commission *KiwiSport* Programme started in 1988) involves advertisements aimed at the lower socio-economic strata of New Zealand society, those showing statistically higher rates of heart disease, diabetes or other health issues related to fast food consumption, sedentary lifestyles, smoking and drinking.

With its structuralist leanings, examinations of moral regulation typically exalt the State as the pre-eminent force in modifying behaviour, and as such relegate individual actors to a peripheral role in shaping the values of societal institutions. However, in line with Rojek's (1985, 1995) analysis of leisure relations<sup>105</sup> and Giddens' (1984, 1990, 1991) theory of structuration, the ruling elite should not be seen as the only force capable of enacting 'moral projects'<sup>106</sup> to manipulate social structure. Following a reformulation by Ruonavaara (1997), I suggest that moral regulation should be viewed as a reciprocal action taking place within social relations that involves persuasive and educational, rather than coercive, forms of social control based on *changing the identity of the regulated* (Ruonavaara, 1997:289, 290; Parker, 2007). This reformulation is based on an examination by Valverde (1994b) and Rojek (1992) of nineteenth-century social reformist voluntary associations, suggesting that these organisations represented 'civil society' rather than the State<sup>107</sup> and constitute an example of moral regulation occurring within interest groups aiming to transform social structure 'from the ground up'. The early Swedish labour movement<sup>108</sup> is singled out for its attempts to create a self-disciplined and orderly worker who in the context of their day-to-day activity would be "civilised and well-behaved [yet] politically radical...Central to this idea was an active acquisition of knowledge and culture, and...an ability to form one's own world-view independently" (Anbjornson, 1991:52 cited in Ruonavaara, 1997:285-286).

The Weberian concept of *lebensführung* (roughly translated: "conduct of life") is also relevant to the concept of moral regulation as suggested here. For Weber, *lebensführung* entails "the behaviour of an active and reflexive individual, the aspects of which [are] subjective meaning and objective significance." Ruonavaara observes that the concept differs from "way of life" in the sense that "[*lebensführung*] stresses the person's 'conscious conducting' of their life...this is closely connected with the element of social identity: when a person begins to see him or herself as a particular kind of member of society, the range of the kinds of actions that are appropriate to him or her is also redefined" (1997:285-286). The goal of moral regulation then is to communicate and instil a 'sense' of this way of life into others, and redefine how people view themselves in the course of everyday social relations. By adopting a redefined identity, the person starts to conduct their life in a new way (Ruonavaara, 1997:290).<sup>109</sup> Based on this theoretical

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<sup>105</sup> Rojek's (1985, 1995) focus being on 'the regularities of social interaction built out of intentioned decisions, acknowledging that society is both existential - built by decision and action - and structural, in the sense of having coercive power over behaviour' (Kelly, 1983:186).

<sup>106</sup> By "moral project" Ruonavaara refers to "the moral regulators conception of *an ideal way of life* and the regulators *long-term commitment to realise that ideal*", rather than to any specific plan of action (Ruonavaara, 1997:289; my emphasis).

<sup>107</sup> 'Civil society' in this case meaning all organisations and secondary groups independent of the State and commercial interests.

<sup>108</sup> Ruonavaara also makes comparisons to the Reformation and the contemporary Green movement as further examples of groups working within the framework of a 'civil society' with their own morally regulative framework.

<sup>109</sup> Further to Ruonavaara's analysis, I suggest that moral regulation may not necessarily take the form of intentioned action; that is to say, there is no imperative formulated at an organisational or idiosyncratic level. Rather, like Bourdieu's *habitus*, "the unconscious dispositions to specific forms of practice including taste, consumption and identity" (Friedman, 1994:9), the move toward a regulation of behaviour can be said to be unconscious and unintended, proliferated through performance and spectacle, action and interaction. Alternatively phrased, it may be said to manifest in the simple act of asserting and validating a defined social identity to a presumed audience, in which the 'self' as a moral project becomes a means to communicate broader ideas regarding an ideal 'conduct of life' as a contributor to science, knowledge and astronomy.

approach, the creation of internal categories that delineate ‘active’ and ‘passive’ participants as characteristic of a wider moral project can be understood as necessary to ensure the ongoing practice of a scientific project concerned with the maintenance of social order; a concept upon which I will further elaborate in chapters two and three.

In the sections to follow, I examine the various methods employed by active observers in their attempt to morally regulate an ethic of contributive participation within the New Zealand astronomical community. In particular, I focus on two approaches: first, the formation and maintenance of informal observing groups (a sub-group of practical astronomers that belong to an established astronomical society) as a means to demonstrate active consumption, and second, the use of internet virtual communities to assert and reaffirm identities associated with practical astronomy and thus normalise behaviour among other participants. Both of these approaches, I suggest, are indicative of morally regulative behaviours in that the focus on contributive participation and active consumption demonstrate attempts to renegotiate existing identities in order to present the wider New Zealand amateur astronomical community as synonymous with the production of scientific knowledge.

### ***Intermission: Ritual Learning in the Meeting Space***

*It's pouring with rain on a squally winter's night, and passing through the double-doors to the meeting room is like stepping into a zoo enclosure full of restless bats; the constant rustle of black umbrellas, jackets and trench coats being removed and shaken mingles with the high-pitched indecipherable chatter of the fifty-something members present at tonight's astronomical society meeting.*

*At least three-quarters of tonight's assembly are men aged between 40 and 70, tidy beards and glasses clashing with unkempt hair caused by the wind and rain outside. The remaining quarter – at a quick survey, exclusively woman over 55 – are here either accompanying their husbands, or in the case of the two sitting to my right, as active members of the society council.*

*“Excuse me – I don't think I've seen you here before. Are you a new member?”*

*The question from the woman beside me is perfectly innocent and under the circumstances of my comparatively youthful appearance, entirely justified - although I can't help but feel a sense of mild exasperation as I prepare to recite my standard reply. This is my fourth astronomical society meeting outside of Wellington, and explaining what it is I am here to do and observe – as interested participant and would-be-anthropologist – is quickly becoming stagnant. Of course I'm polite as possible; to act disinterested would be lunacy in the face of a potential informant. But repetition and fatigue from hours of driving have made my brain turn into a thick paste, and attempts to explain my position are like air bubbles struggling to break the surface:*

*“Oh no, I’m not actually a member...I’m doing some research...up from Wellington...oh the drive wasn’t too bad!...uh, well it’s anthropology...it’s a...I guess you could say it’s a sociological study of astronomy...yes...well it’s kind of similar...um...no...well basically I’m looking at...at...I’m just here to observe really. I’m going out with John to the observatory tomorrow night...yes that’s right...yes definitely, I’ll make sure I do! Thanks, thanks a lot...”*

*The brief conversation over, I pick up a newsletter that’s been unceremoniously dropped on the floor beside my chair and begin to scan the columns for anything of interest. As it turns out, it’s not astronomy related – just a piece of rubbish left over from an investors seminar the previous night. Still, having left my notebook in the car, it will do nicely.*

*As members (all affiliated with that often cited but empirically elusive category ‘the middle-class’) begin to coalesce into their respective social groups – whether through established friendships, work associations or simply via new introductions – the contrast in sartorial inclination also becomes apparent. The active observers or ‘practicals’ are easy to identify: their permanently-affixed Swandri’s and threadbare woollen jerseys tuck over faded jeans that run into equally tattered fabric sneakers, characteristic of those who’ve traded their suburban fields for rural ones and bedded down in lifestyle blocks or farmlets to escape the forests of sodium arc-lighting in the city centre. The principally academic ‘armchairs’ however prefer the comfort of a decent pair of leather shoes, dress trousers and a suit jacket - although the odd multi-coloured woollen jumper also makes an appearance among the sea of black and grey that dominates the three back rows. At the front of the room two of the ‘practicals’ wrestle with a spaghetti-like assortment of leads and plugs for the laptop and multimedia projector sitting atop a small table, their faces a mixture of worry and frustration. Suddenly the front wall lights up with a blue haze and laughter erupts from the pair as they celebrate the deciphering of some unarticulated mistake. The projector now working, practical number 1 focuses the screen as practical number 2 inserts a compact disk into the laptop before making his way to his chair.*

*Society President David strides up the middle aisle, carrying a conversation on next week’s public night with a council member standing at the back of the room as he goes. As he passes the table holding the projector, the now-seated audience grow silent and audibly shuffle themselves to face front. David doesn’t need to appeal for calm or quiet; everyone knows this routine off by heart. After a cheerful welcome to the group and a comment on the unruly weather, David introduces council member Sarah, a short, wild-eyed woman with thick glasses who takes over with a series of administrative notices. There’s an astro-camp for the under 10’s coming up next month (great for the grandchildren, and registration is a must - so get in quick and don’t forget your binoculars!), a meeting of the Vintage Machinery Club next week for those who are interested (although no-one – aside from Sarah - seems particularly enthusiastic) and a reminder*

*that the next cycle for the payment of dues starts again at the beginning of next month. Sarah thanks the audience, to no audible acknowledgement - save for the sound of someone emptying the contents of their nasal passages into a tissue toward the back somewhere - and takes her seat. David flicks on the multimedia projector and goes through the process of finding an image buried within multiple folders as the crowd sits patiently. A photograph of the local observatory flashes up; several insets at the top right of the main image contain close-ups of what appear to be breaks, rust chips and flaking paint. David announces that there's some fundraising required to make some minor repairs, and that some leaks have manifested at the edges of the aluminium dome. The floor is opened to suggestions.*

*"We could ask for a small fee for public nights? Some would be fine with that I suspect...those with children perhaps..."*

*The audience murmurs in scepticism. Someone suggests a fundraising event of some kind that "doesn't have to be astronomy related - a car boot sale...a junk sale...Does anyone want to help with the organisation?"*

*As the discussion continues, it's apparent that there won't be any consensus this evening. David puts forward the motion that those who are interested in organising something can approach Sarah after the meeting. "Additionally, we're having some issues with car access to the observatory site...those of you who've had the pleasure of meeting our neighbour will probably be aware that he's spoken to the council about the zoning situation...so we might have to consider, just for the meantime, either parking further down and taking the back steps up to the site, or being a bit cautious with our headlights as we come over the rise." An audience member buried in the middle row pipes up that the issue only really arises on public nights "when it can get a bit noisy" but otherwise, there's no need to complain. A hand up front signals to David, and he stoops down to listen, a private conversation ensuing while others in the audience chat amongst themselves. David straightens up and announces that it's best things move on, turning the floor over to Duncan, another council member who has his own monthly slot on the agenda.*

*Duncan wastes no time in launching into his segment, 'Duncan's Astro-News'. A few clicks on the laptop and the disk whirs into life, bringing up a PowerPoint slide comprising a sky chart for tonight (although it is noted that the weather precludes any chance of a viewing session). The constellations and star positions are named and marked out with intersecting white lines, prompting some of the front-row members to interject with humorous cries of "it's too complicated!" and "too much information!" The good-natured ribbing is taken well by Duncan who states that he put them in this time "just for those of you guys who weren't sure what was what!" The hilarity subsiding, Duncan continues his segment, bringing up another chart, although it's immediately apparent that in his haste to prepare tonight's presentation he's copied the wrong image - that of the Northern Hemisphere, instead of the South.*

*“It’s American longitude! Orion’s upside-down!”*

*More laughter ensues. Duncan attempts to salvage what little dignity he has left in front of his peers and jokes that he put it in there “in case anyone happened to be travelling to America in the next couple of days,” provoking further amusement. The next series of slides - images of Comet McNaught – draw out more appreciation than condescension from the audience, with a collection of prize-winning images from the internet displayed in quick succession. Duncan concludes this section with a series of photographs he has taken himself of astronomers, parents and children silhouetted at dusk, observing the Comet’s spectacular tail as it bleeds into the horizon.*

*Having regained their attention, the penultimate slide immediately begins with an embedded video file, “NASA and Space Exploration”. The video, downloaded from the aforementioned organisation’s website, runs like a Hollywood movie trailer; quick jump cuts and CGI animations of swooping and diving satellites interweave with dramatic music and scores of voiceovers from NASA scientists and enthusiastic astronomers on planned future explorations of the solar system. Duncan stands by, suitably impressed, but the audience reaction once again becomes one of mirth: the serious tone and overblown, earnest sentimentality of the NASA presentation is too much for most, and by its conclusion half the crowd are audibly chuckling or attempting to stifle laughter, hands firmly clapped across their mouths. Duncan, sensing this undesired effect, clicks again and NASA is unceremoniously replaced by images of a recent lunar eclipse as viewed from Nigeria. Having returned to firmer ground, the crowd become suddenly quiet and seem genuinely interested. Using a pointer, Duncan traces the movement of the moon through Earth’s umbra, prompting some to interject with comments and questions on topics ranging from light refraction to Earth’s axial tilt. An elderly gentleman in the second row states that the next lunar eclipse will be visible in the southern hemisphere on August the 28<sup>th</sup> – to which an unknown voice in the back row shouts: “another rainy day!” The joke regarding New Zealand’s changeable weather patterns generates laughter from the audience, predominately among the practicals (even if the joke was, ironically, a little ‘dry’ itself). His segment over, Duncan receives a hearty round of applause for his efforts and David once again takes centre stage.*

*“Thank you Duncan, I think we all learned a thing or two there...at least what we can see in the Northern Hemisphere anyway [the crowd laugh quietly]...No, no very good, very good...Now everybody, it’s my pleasure to introduce Jim Monaghan, who’s come all the way from just outside Wellington to talk to us about comets. Specifically, the greatest comets in history...now Jim is I believe also an amateur historian...oh sorry yes, sorry ladies and gentlemen, he is actually employed in that field...and I believe Jim that you’ve got a very impressive presentation with you this evening?...[Jim, a comparatively younger-looking man than the majority of tonight’s audience, grins sheepishly and puts his hand up in mock denial]...Well I’m sure you’ll all appreciate it...Richard, can you dim...oh ok, yes...can you switch off the lights please Richard? Brilliant. Ladies and Gentlemen, Jim Monaghan...”*



*Although arguably (over)long at an hour-and-a-half, Jim's presentation is very impressive as it turns out; situating astronomers understanding of comets in political and scientific contexts, the talk runs the gamut from the inner workings of medieval observatories to comet trajectories and their physical properties. The slides project images of Chinese renderings of comet sightings circa 300AD, contemporary photographs from the 1970's through to recent shots of Comet McNaught, and elaborate diagrams and illustrations on the makeup of comets (including the nucleus and two gaseous jets – one composed of water vapour and the other of nitrogen, sodium and other elements). A heavy theme of astro-photography is also present throughout, leading many to interject with questions on setup, film speed (for those who haven't made the transition to digital just yet) and associated costs. The end of the presentation concerns some of the more theoretical propositions associated with comet and planetary formation, prompting Jim to remark - much to the audience's amusement - that "at the end, some of you will be terribly, terribly confused...but at least you'll know what you don't know!"*

*Jim finishes with an open invitation for questions. An older member in the second row raises his hand and launches into an anecdote about his years of comet-hunting – which goes on for approximately three and a half minutes before he asks a completely unrelated question regarding ancient Chinese astronomy. Someone two rows back shuffles in their seat, half-stands and leans over to flick on the lights as David makes unintelligible hand gestures to someone in the front row. The end of the lecture merges haphazardly into the end of the meeting proper, as separate pockets of the audience begin to talk and converse with increasing volume. At the back of the room, a cheerfully shrill female voice announces that supper is being served, prompting the back three rows to immediately get up and make their way toward the table that has been quietly set up during the course of the presentation. A sea of random bodies form a scrum, hands reaching in and grabbing what they can of the collection of shortbread biscuits and beverages. A voice to the right pipes up and asks that people consider giving a small koha to go toward the rental of the venue for this evening, although the request is muffled somewhat by the constant clink of cups hitting saucers as members exchange stories and social pleasantries in between sips of tea or coffee. After a brief lull in the conversation the sound of a few gold coins hitting ceramic can be heard.*

*A few minutes pass, and the herd mentality of the group begins to dissipate; conversations in progress are carried off in two's, three's or more to separate areas of the room, cups and biscuits balanced precariously on overloaded saucers. One corner contains three visiting members of the Christchurch Astronomical Society who are in the process of being politely cross-examined by two of tonight's regulars;*

*"So what brings you up here?...Really?...Oh I see..."*

*"How's things going down there?...Did you manage to catch..."*

*“Do you know [so-and-so]?...Yes?...What’s he up to these days?”*

*“What equipment do you own?...Mmm, oh yes... Well I’ve got...”*

*Two of the ‘armchairs’ are sitting on the edge of the aisle that runs up the middle of the meeting room, saucers in hand, engaged in what appears to be some heated dialogue concerning the composition of Comet McNaught’s gas trails and the effect of the solar wind on particle dispersion. One is a planetary geologist, mid-sixties, with a large beard that obscures the top of his tweed jacket; the other has a thick accent which sounds German; and he actually looks like Einstein. His rain-matted grey hair has dried and twisted, giving him the appearance of someone on the receiving end of a massive static shock. Their discussion shifts to the atmospheric composition of Titan, deviates into the formation of Earth and concludes with an amicable chat regarding the theory that Earth’s water originally came from comets in the later stages of development.*

*Just as I’ve made the decision to leave and start the journey to tonight’s motel for some much needed sleep, council member Sarah spies me checking out the array of name badges on display by the double doors as I prepare to exit. She sidles up beside me. “There’s no rhyme or reason for them being there,” she explains with a grin, “they just started as an idea someone had so people could use them, to get to know one another, but people didn’t really...they didn’t end up using them you see. Some of these people [pointing at the badges] aren’t even here anymore! Geoff’s gone, Ian...well he still comes sometimes. I’m just as guilty though, I left mine at home tonight.” With that, she leaves to pursue a conversation with someone gesticulating at her from the front of the room. To my right, two practicals are discussing technical issues; a ‘broken control’ on one’s scope has caused a myriad of other problems that “can’t be fixed the usual way.” Whether “the usual way” involves black duct tape – based on what I’ve observed so far, a standard addition to any homemade or modified telescope – is left to the imagination, but I’m almost willing to bet money that it does. The conversation soon turns to the payment of dues, raised earlier in the evening by Sarah. Practical number 1 has spoken to George (the council’s deputy president) about the membership fee being too high at \$40 and suggests that they need to be competitive: there are plenty of other groups in the area that can offer a range of interests for those that want to use their time effectively. “I think it’s a bit of a barrier to membership actually...in [so-and-so’s] group there’s apparently 100 paid-up members...yeah I’m not sure how, but they seem to have a steady supply every year...” George has evidently stated that fees need to be high to cover all the affiliated costs. “Maybe we’ll have to do without the biscuits and all that...whad’ya think?” Practical 2 is smirking. The conversation then shifts to plans for tomorrow night’s observing evening that John – my informant – is attending, and the primary reason for my journey this evening. But there’s no time for me to go over and introduce myself – people are already collecting coats and bags from their abandoned seats and making their way toward the exit.*

### Informal Observing Groups

I had the opportunity to participate in a number of informal observing sessions in various towns while conducting research for this paper in 2007. The timing was not ideal as it coincided with New Zealand's winter season (and of the evenings I did attend, the majority were abandoned completely due to excessive cloud cover or rain). On those evenings when conditions permitted, only three went 'the full distance', stretching on until the early hours of the next morning and finishing between 2 and 3 am. Informal observing groups (henceforth abbreviated as 'IOGs') tend to be comprised of practical astronomers in small bands of anywhere from four to ten members<sup>110</sup>. One respondent suggested that the informal cliques within the society structure were easy to identify:

There are those guys that do their own thing, you know...they sometimes disagree with the council or they want there to be more in the way of observing nights for the group [because] that kind of thing is left up to the committee, they...choose when and where things happen. And so these guys, they get a group together...friends or, people interested in the same kind of things...They go and set up out in an area that they've scouted, somewhere away from the city and the lights...they know *all* the best places to go...they're still a part [of the society] but they...they operate 'under the radar'.

All members of the IOGs I observed were involved in some form of amateur-professional collaboration. Accordingly, all members of IOGs owned their own telescopes, with one or two in the group having either constructed their own, or attempted to do so since joining the group. In some cases, members may have private home-built observatories for use by the main group<sup>111</sup> and the IOG. While the group itself may be constitutive of some pre-existing social ties, for instance friendships or work relationships, the most important factor that draws practical observers toward the formation of IOGs is contributive participation. One IOG member noted that although he and a long-time friend had joined their local astronomical society together, they did not necessarily 'hang out', as his friend was more interested in cosmology and theory as opposed to active observing.<sup>112</sup> Members of IOGs are also the most likely to be those members of the main society engaging with the public on a regular basis; this usually takes the form of volunteering to open up and lecture at a local observatory on public nights, or the setting up of stalls and telescopes at 'sidewalk

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<sup>110</sup> Though I have observed that IOG numbers may comprise 15 to 20 in larger cities. There is a functional and pragmatic reason for keeping numbers down of course: fewer members mean that the logistics of picking up those without transport, moving equipment, and organising the evening are simplified considerably. Similarly, informal observing sessions are far more socially intimate, in that conversation between participants flows freely and may range from the public to the personal; an added benefit not found in larger groups, where behaviour and speech is more likely to be self-monitored.

<sup>111</sup> Based on the IOGs observed, members are most likely to *not* be on the local astronomical society committee, although I was informed that exceptions exist in smaller towns where networks are dense (for instance, the role of president and treasurer is fulfilled by a sole individual who also happens to have a passionate interest in active observing).

<sup>112</sup> In his study of amateur archaeologists in the United States, Stebbins (1979:130) suggested that informal expeditions generally occurred among people whose age, education or occupational and social class status were substantially more homogenous than found in the organisation as a whole. This usually occurred in tandem with more pragmatic aspects of group selection such as people who are easy to get on with and with the same degree of practical expertise.

astronomy' evenings where interested members of the general public can stop and view higher magnitude objects such as Jupiter, Mars or the Moon while out shopping in the central business district.<sup>113</sup>

A staple of the informal observing evening is a light pollution-free area, which involves making a journey approximately 10 to 15 kilometres out of the town centre to a rural or semi-rural location. The pre-observing ritual consists of telephone calls, text messages or emails, culminating in an agreement regarding who will pick up whom and when, which location will be used (or, if the location is a new one that has been scouted by an IOG member, map directions for the benefit of others in the group) and the eventual arrival at the destination. Once the equipment has been unpacked and a quick appraisal of the weather has been made<sup>114</sup> – a necessary evaluation in the winter months as cloud and rain can roll in within a short space of time – the telescopes are set up and calibrated; lenses, tracking devices and timers are fitted, fold-out camping chairs are planted and plans are made for the evening's viewing.

Observing evenings vary depending on the amount of planning or cloud cover, but most can be divided into four overlapping categories: *'just' viewing*, *tracking*, *active viewing* and *active hunting*. *'Just' viewing* is mostly recreational, and involves IOGs sitting and observing higher magnitude objects such as Jupiter, Saturn or Mars, or attempting to find orbiting satellites in (Hubble, MIR or the International Space Station for instance). This provides a chance to relax, hold informal conversations and experiment with different lenses and magnifications. Some may engage in astrophotography, or use the opportunity to test one's skills at 'spotting' – finding well-known but fainter deep-sky objects by relying on memory only. *Tracking* involves following a specific star, constellation or galaxy, nebula or globular cluster for the entire evening, and can be considered a subset of the *"just viewing"* category. The notable exception is that 'tracking' requires a constant manual adjustment to the scope to follow the path of the object as the Earth rotates. *Active viewing* characterises the majority of informal observing evenings, and constitutes the point at which leisure and scientific observation converge in the activity of information gathering for collaborative purposes. If viewing a lunar grazing occultation for instance (in which the moon's orbit passes in front of a background star), members of the IOG will record data concerning the event; the time, the potential topography of the lunar surface in relation to the star's movement, and the star's spectroscopic behaviour – which in some cases may reveal the presence of a binary star system, especially if a degree of 'wobbling' is observed. IOG members may then upload this information to a website or database once at home, or

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<sup>113</sup> 'Sidewalk Astronomy' has grown in popularity among active members of the community in recent years, and involves setting up telescopes, stalls and information boards in busy metropolitan areas. While the aim is to stir interest in astronomy itself, the setup also encourages those who stop to look through the scopes to think about the level of light pollution present in the city. In an email communication from the Wellington Astronomical Society e-mail list, astronomer and environmental activist Paul Moss states that: "[t]his is the week leading up to 250+ events world-wide on the 19<sup>th</sup>...it has grown this year to a full international event...It is important to keep the series of events in our mind as a conscious process of waking up the public to our activities and generating the necessary word of mouth to grow the community of common interest...to maintain the consciousness of the knowledge, and increase its perceived importance." (email communication by Paul Moss; [announce@was.org.nz](mailto:announce@was.org.nz) mailing list; 14 May 2007)

<sup>114</sup> If the weather is prohibitive, depending on how far the evening has already progressed (for instance, if telescopes have already been set up, or if members have already arrived at the location), planned outings may instead be transformed into a social occasion; participants may use the opportunity to retire to the closest member residence for an impromptu lecture, or the discussion of recent astronomy-related findings, usually over beer, coffee and food.

occasionally via a laptop with wireless connectivity in 'real-time' if brought along for the evening. *Active hunting* involves scanning the night-sky and locating objects of significance - usually in response to reports from astronomy bulletin boards and websites (such as Space.com or NASA) or an announcement at local society meeting regarding potential NEOs (Near Earth Objects) that may be seen with a decent telescope. While much rarer than occultations, many of my informants could recall specific events that they had witnessed first-hand, or had at least attempted to witness (there were also many stories of bitter frustration with the New Zealand weather), such as meteor showers or Comet Shoemaker-Levy 9 (1993e) and its subsequent crash into Jupiter in July 1994. Despite fair warning however, hunting for asteroids and comets is labour intensive with smaller aperture telescopes, and for this reason is often undertaken in conjunction with astrophotography, where images can be captured via a CCD or high-quality digital camera. Photographic frames can be hot-linked to a laptop, and pixel noise refined using various software programs that compensate for atmospheric fluctuations, temperature and the thermal characteristics of the imaging equipment. As with *active viewing*, this data will be recorded, catalogued, uploaded and shared for the benefit of collaborative projects via the internet. At the conclusion of the observing session, members of the IOG will either pack up and go their separate ways (which, for a weeknight is standard practice as most will have work commitments the following morning) or retire to a member's home, if the session has taken place during the weekend:

Sometimes...you'll call it a night early...if it's a weeknight anyway, we'll usually stop sometime. We have jobs, there's [work] the next day. Sometimes we'll finish for the night at midnight, but the best [objects] might not make an appearance until oh, 2 or 3 in the morning...so it's good in the weekends, for those of us that don't have work on a Saturday or a Sunday morning, you can go all night into the wee hours if you want to...stay out until three and go back to so-and-so's place, have a cuppa, drive home...if [a fellow member's] got his computer running, you can check your notes, use the FTP [File Transfer Protocol] on some of the sites [to upload the evening's data].

Informants involved with informal observing groups cited a variety of reasons for their formation, including specialised interests in occultations, galaxies and nebulae, planetary atmospherics or comet hunting. Personal interests aside, there were also repeated references to one's dedication to the amateur-professional collaborative process, which carried with it a positive 'by-product' of socialising with like-minded society members. IOG member Mark stressed the importance of collaboration in suggesting that:

You're involved in something 'bigger' if you like...By 'bigger' I mean that...*responsibility* to be the eyes of the guys involved in the [professional] side of things...They have access to equipment...out of the reach of most of us [in the amateur community]. But they're on a budget, they have to apply for funding and compete for time...not just [Lake] Tekapo but overseas...the [observatories] in Chile, Australia...they've all got such small chunks of time compared to us. I mean...we have lives too, but we have...more freedom. Not so much red tape...they have superiors, who tell them what they can get funding for and for what they can choose to dedicate the resources they have...we cover all the other stuff...they're happy to get it from us. Even if you don't get personal thanks...you might be acknowledged in [an academic] paper. In New Zealand that seems to happen more often. [Professional astronomers] like our contributions, they

respect their quality...That sounds a little overblown! *[laughs]* I know that some in the [United] States, they grumble that they get no recognition...personally, for me anyway, it might be different for some others, but for myself, I really couldn't care less. It all comes back to you in ways that actually benefit you in the long run...it's more than just being published.

Likewise, Adam made reference to New Zealand's privileged position in the Southern hemisphere (a common source of friendly rivalry between North American and Australasian astronomical communities):

I'm...committed to comets and comet observations, cometography, because in the Southern hemisphere we're in a really privileged position, when you look at the map of the world, all the land is up north and not much down south, and so being in the Southern hemisphere, we can do a lot of good science down here, because there's so many with telescopes. And I feel that I have to do follow-up observations of comets and so forth to record this for posterity, and also to show people in the northern hemisphere what's happening.

In this sense, contributive participation can be viewed as something idiosyncratic and individualistic. However, the emphasis placed on group participation invokes the question of why, considering the dynamics involved in coordinating people for the occasion, IOGs exist as opposed to individual members simply conducting observations in their own time. One interpretation is that by forming IOGs, amateurs can engage in the act of collaborating with each other, something that also makes the mechanised act of uploading field data to websites – especially for international projects where amateurs collaborate with social networks they are never likely to encounter in the flesh – concrete and tangible; a reflection of the time and space shared with other observers. IOG member Mark narrated his perspective as follows:

I have gone out on my own...I mean you *can* do it alone, but, it's better when there's a small group of you because you get to help each other out. It's like...you have this small *collective* if you like, a small group who are into the same things...there's some differences in what people are interested in, but the main, the [unifying] thing, the goal if you will is that...you're all intending to contribute something...to the CBA [Centre for Backyard Astrophysics], you know, I do a bit of that, or on behalf of the main group, as...an ambassador for the [local society].... I mean you do it to please yourself, that's definitely one side of it, you connect in a personal way with the sky...do real astronomical science out in a field somewhere...But to *share* that with others, they all have the same idea you know. So why not? It's fun too...you joke and tell stories...have a bit of fun. It's not all sitting silently and watching...you get to share useful information with each other. And there's mutual support for what you're doing...the [statistics] you're getting, you can use each others equipment, you know...use their laptop, or borrow something, a lens or whatever you need...it's great.<sup>115</sup>

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<sup>115</sup> When providing descriptions of informal observing sessions, informants often weaved social interaction, descriptions of equipment and a standout moment into a narrative that presented the experience as productive, social and enjoyable. Informant Tim relayed this anecdote from two weeks prior to our interview taking place: “[One of the members] of our little group...he made a pair of 13 and a half inch binoculars...they were just brilliant, you could start to see colour in the Orion Nebulae, really quite special...we managed to get out a couple of weeks ago when there was a good comet out...through those 13 inch binoculars it was just amazing...we got... some good data that night...then a...bit of a Tiki Tour through the back roads...the fog rolled in, we couldn't see more than ten feet in front of the car, on these back roads in the middle of nowhere, no seal, potholes everywhere...[the owner of the binoculars] was shitting himself...more about the binoculars getting damaged...than the actual car itself you know *[laughs]*...it was a good night.”

However, there were also indications that a catalyst in forming IOGs was a feeling of dissatisfaction with their local society committee. It should be noted that this rarely took the form of outright derision; rather, it was “a quiet frustration” that the committee was either not putting enough effort into planning and arranging observing events and star parties, or was overemphasising cosmology lectures at the expense of practical information on telescopic observing. When questioned on this topic, Martin expressed his frustration that:

It's getting harder and harder to get a decent observing group going...you have to locate a decent place and even then, if its somewhere out of the main centre [of town] it really needs to be done over a weekend and that can take, months of planning in advance...organising a location and accommodation...at the end of the day...it's better [to go with] a smaller group, people you know and have experience with.

In one sense, the ability to engage in contributive participation was also allied with a perception that the committee was influential in mediating contributions by virtue of one's membership. Gareth, a regular contributor to a variety of international collaborative projects, suggested that his membership had both “positives and negatives...the downside is...it's only insofar as it can get a little repetitive, a little bit like [a] ‘stuck wheel’ you know...it feels that way occasionally...sometimes they won't listen [to your ideas] because it's not in the best interests of the group or whatever. But you feel obliged to go along.” Gareth further elaborated in explaining that this sense of obligation was strongly linked to *affiliation*:

I mean that's kind of the catch-22 isn't it, I mean...you [go] along to the meeting and get some useful information, you go because...it's a chance to exchange information with other people...Sometimes its [the meeting] just...its like its turning into a classroom lecture, you just show up to listen to the same old stuff, nothing new happening...you can get it [up-to-date information] from the internet I guess, stuff on cosmology or how to properly calibrate your telescope, but you have to be a member or you have to be affiliated with something, some kind of place or group to contribute [to international projects] because...well, when they write it up in the journal or the newspaper or something you have to be attached to something you know...‘so and so is a member of this group’ or ‘is associated [with this observatory], that kind of thing.

Rojek (1985:20, 70), drawing on Weber's (1970) examination of the bureaucratisation of body and society, suggests that “the institutionalisation of leisure, in the shape of member's rules, news-letters, festivals and competitions, has extended the power of discipline throughout leisure activities...the individual pays homage to the obligations of his chosen leisure enthusiasm almost as a condition of participation.” This is true insofar as amateur astronomers act within formalised structures of social interaction and knowledge sharing. Collaboration with professional astronomers, and the schedules and rules of the astronomical society themselves, entail regular interaction with administrative and bureaucratic functions that maintain the discipline and structure of the activity. However, this perspective should not be misinterpreted. This excerpt from a discussion of membership to the Royal New Zealand Astronomical Society on the *NZ*

*Astronomers Yahoo™ Group* was in response to a users suggestion that the umbrella organisation appeared to be a “bureaucratic committee”<sup>116</sup>, far removed from the daily realities of local observing groups:

I see [RASNZ] as a way to support the activities of a lot of smaller societies, which are perhaps much more tied to and reliant on RASNZ coordination, information...I also suspect that while some of the larger societies (Auckland, Phoenix, Wellington, Canterbury, have I forgotten anyone?) have relatively large memberships, smaller societies scattered around the country seem to have a substantially higher ratio of people who are actively out doing things rather than just reading a newsletter or turning up to speakers at meetings every month...The other big thing that I feel I get out of RASNZ is, quite simply, the recognition factor for when I \*am\* doing something that I'd like support for. For instance, one of my pet projects in the past few years has been campaigning about light pollution. If I can throw the name of RASNZ behind things that I do at times when it makes sense, it makes it \*much\* easier to get recognition.<sup>117</sup>

In this respect, the positive benefits of assistance for individual and group objectives is recognised as having the potential to filter downward. Additionally, astronomical society newsletters contain a multitude of useful facts and collated information for practical observers, including weather predictions, the positions and magnitude of solar system bodies, lunar phases, projected occultations, meteor showers and comets, as well as detailed sky maps. The negative aspects of the larger structure work in parallel with the positive attribute of recognition, enabling dense social networks to reproduce aspects of the larger structure<sup>118</sup> on their own terms without sacrificing their perceived autonomy.<sup>119</sup> Affiliation to the main astronomical society also allows active observers to utilise support from RASNZ or their own group for projects that contribute directly to the stated aims and

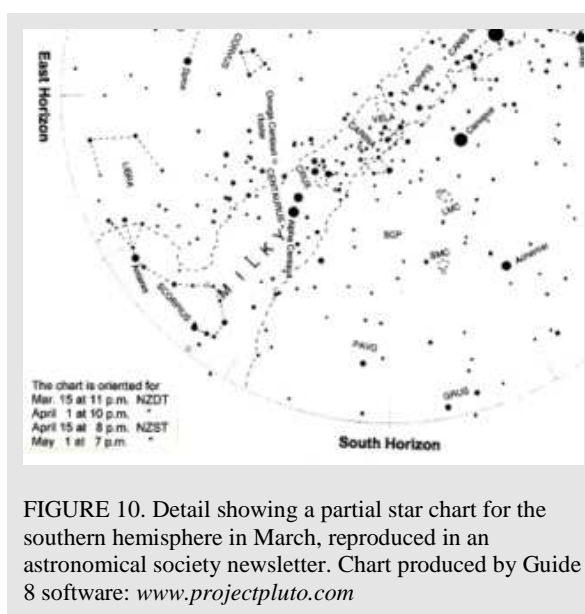


FIGURE 10. Detail showing a partial star chart for the southern hemisphere in March, reproduced in an astronomical society newsletter. Chart produced by Guide 8 software: [www.projectpluto.com](http://www.projectpluto.com)

<sup>116</sup> As societies and their committees operate within the larger RASNZ hierarchy, they require a bureaucracy overseen by professional astronomers and influential members of Aotearoa's scientific community. The presence of the committee at a local level is apparent in society publications: requests for the payment of dues, committee notices, official email announcements and as a motivating force in the organisation of public nights and official observing evenings and 'star parties'. When one becomes a member of the society, reminders of one's place in relation to the general structure is fairly overt.

<sup>117</sup> 'Mike', Yahoo™ NZ Astronomers forum; Sun Jan 2, 2005: <http://groups.yahoo.com/group/nzastronomers> (last accessed 14 March 2008)

<sup>118</sup> The formation of informal observing groups in this respect demonstrates a pragmatic dialectic between the creation of social networks focused on maintaining a value system congruent with the wider goals of the astronomical society and its parent organisations. The practice of 'formative-beneficial' acts of expression, while in tension or opposition to the perceived bureaucratic arm of the main group, can certainly serve to contribute to the overall effectiveness of its operation, and assist in achieving the desired goals of the society in general (Wicks, 1998:380).

<sup>119</sup> As previously stated, the post-lecture segment of the meeting provides a valuable opportunity for informal discussion on a variety of topics; 'practicals' in particular may discuss matters such as the calibration of telescopes, or potential locations for observing. From a motivational perspective, attending meetings has the effect of 'enforcing' adherence to an obligatory schedule that can be beneficial; a means to utilise a set time and format to catch up and plan informal outings with like-minded members.



objectives of the wider astronomical community; for instance, campaigning against light pollution or a commitment to public education (both of which will be covered in the next chapter). In turn, observers can make use of larger organisational resources and networks to further their own interests in shaping and transforming their immediate social world.

Rather than a case of ‘resistance’, the formation of these groups should be seen as indicative of a conscious monitoring by ‘practicals’ of their immediate and wider social networks – the meeting environment, the committee and the organisational elements of the astronomical community – as structures that harbour the potential to foster an ethic of contributive participation, but that *also* have potential to foster passive consumption. By using demonstrative action and actively consuming materials pursuant to astronomical observation, the maintenance of these groups seeks to normalise the perception that New Zealand astronomical societies are synonymous with amateur-professional collaboration and contributions to science. Following Rojek’s (2000:16) proposal that “to be noticed in modern industrial-urban culture we must be adept ‘performers’”, these groups, while performing for themselves, also perform for networks of participants in the wider astronomical community (Kelly and Godbey, 1992:323). Local society newsletters, available online or distributed nationally, often contain brief stories that range in scope from reports by informal groups on their most recent adventures to significant discoveries by professionals that were assisted by data obtained by active observers. Some of these news items go into specific detail concerning the role of amateur observers, such as the discovery of extra-solar planet OGLE-2005-BLG-071 in 2006 by Auckland Astronomical Society amateurs Grant Christie and Jennie McCormick as a part of the MicroFUN international project (*Law and Health Weekly*, 15 April 2006:45; Naeye and Aguirre, 2006:96-97). Other news reports of significant discoveries, while not directly addressing contributions by amateurs, will nonetheless outline the primary project (for instance, the *CBA* (Centre for Backyard Astrophysics) or the *MOA* (Microlensing Observations) initiative) and the teams responsible. In this sense, astronomical society newsletters that identify the affiliation of specific individuals with ‘their’ group, coupled with the intimate sociality<sup>120</sup> of the New Zealand astronomical community, ensures that practical contributions made by members of IOGs to the projects in question are irrevocably associated with the reported discovery. In effect, this demonstrates how the success of actions in achieving objectives can lead to the social reproduction of patterned practices that not only reproduce structure, but also harbour sets of underlying values that motivate attempts to transform it (Kuentzel, 2000:90; Stokowski, 1994:100-106; Giddens, 1990). A morally regulative element is used to the effect that the goals of the wider astronomical community are furthered by contribution, summarised in Weber’s (1921 [1978]) ‘heroic ethic’, reflected in the discoveries made by professionals. Those who don’t contribute are subsequently marginalised as “spectators” on the fringes of a larger, combined set of efforts made by practical astronomers (Löfgren, 1994; Friedman, 1994:182; Miller, 1994:93). In this respect, Martin made a conscious link between active observation and a holistic approach to the scientific process in stating:

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<sup>120</sup> An informant used the term “incestuous” in stating that New Zealand was a place “where everybody knows everybody, and everybody knows everybody’s business.”

I'm...sympathetic to cosmology and theory...but [these] should be seen as a means to an end...You can't go out and observe, you know, go and try to look for something...scientifically significant without having theorists who actually do the math, working on the big questions in the first place...That's the rationale behind science...have a theory and observe...back in the day it was 'oh the moon moves this way because of these factors', and then you test that [through] observation,...you revise your ideas until it all starts to work, there's a very strong attractive force between the stuff on paper, the theory, and the formulas, and being able to see it...Like, 'why do the stars move in that direction', or what about dark matter, or dark energy [exerting] tidal forces over star clusters...that's how you know what to look for...But it shouldn't just be about sitting down and thinking all day and night without putting it to some use...you've got to see it for yourself.

As the structure of IOGs requires social maintenance, theories of *social capital* are useful in examining how these smaller communities reproduce themselves. While the function of social capital is phrased differently in various literature<sup>121</sup>, all approaches suggest the creation of an 'in-group', or a dense social network with a set of rules and regulations that may or may not be explicitly articulated. Glover and Hemingway (2005:389; Sobel, 2002:151) define social capital as the "persistent social ties that enable a group to constitute, maintain and reproduce itself", which may enable individuals to "expand embodied cultural or informational capital through connections to experts and connoisseurs, or enhance institutionalised cultural capital by ties to organisations that bestow valued credentials and honorifics."<sup>122</sup> In a similar vein, Putnam (1995, 2000) defines social capital as the "social networks and the norms of reciprocity and trustworthiness that arise from them", a "social glue...binding together individuals who might otherwise fragment" (2000:19). Coleman (1988, 1990:302) suggests a set of "social-structural resources...embodied in relations among people" (1988:S117), emphasising that dense social networks "all consist of some aspect of social structure, and they facilitate certain actions of actors who are within structure". The most significant aspect of Coleman's approach is his suggestion that social capital serves as a regulatory device, creating "a common knowledge of information", increasing "the quality and reliability of third-party monitoring needed to enforce cooperative dynamic equilibria" (Coleman, 1990:302). In this sense, social capital can be seen as a potential tool for ensuring the internal harmony of the IOG which in turn nurtures the potential for engaging in broader socially transformative projects. Glover and

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<sup>121</sup> Bourdieu (1986) for instance framed social capital in economic terms; an "investment strategy" in which people establish social relationships that are directly usable in the short or long-term. Or as he defines it more emphatically, "the aggregate of actual or potential resources which are linked to possession of a durable network or more or less institutionalised relationships of mutual acquaintance and recognition...which provides each of its members with the backing of collectively-owned capital, a 'credential' which entitles them to credit" (Bourdieu, 1986:249 *cited in* Glover and Hemingway, 2005:390; Sobel, 2002:139).

<sup>122</sup> An alternative to social capital theory is Maffesoli's (1996) concept of neo-tribalism. With a nod to Bourdieu, Maffesoli proposes that people in metropolitan areas with the same lifestyle, worldviews and affinity of *habitus* may share the same politics of everyday life and form small 'neo' or 'urban' *tribus*. The emergence of *tribus* is explained as a hallmark of modern social life; individuals belong to a multiplicity of overlapping groups at any one time. Enacting performances, or playing the appropriate 'role' assists in affirming an identity and subsequent classification with a specific collectivity. Maffesoli suggests that forms of moral regulation can emerge within these collectivities as they have strong powers of integration and inclusion, displayed and actualised by exhibiting group-specific styles of adornment and behavioural patterns, and espousing the shared values and ideals of the group (Smith, 1996:xi-xii (*translator*); Maffesoli, 1996).

Hemingway (2005:389-391) suggest several identifying characteristics of social capital that are applicable in this case: *the obligation to invest in social relationships based on an expectation of reciprocation*, observable among IOGs in that the expectation of an invitation to join others for an observing session will be reciprocated should the invited member find a new and accessible light pollution-free location;<sup>123</sup> *information potential that enables individuals to access expert or specialised information*, for example, the sharing of practical knowledge in the field, and enabling access to resources of an extremely high standard such as a professional or home-built observatory, should one member of the group have contacts that would enable the group to utilise them; *resources that are appropriated for the purposes of the group*, in which IOG members take it in turns to provide the use of equipment (telescopes, or additional apparatus such as interchangeable lenses or filters) and expect others to do the same; and *an intentional organisation that brings people together to create a new entity that directly benefits/supports them but also benefits those who are less immediately involved* - a case in point being that members of informal groups will also be the ones to regularly engage one-on-one with members of the general public for the purposes of education.

Putnam's (1995, 2000) proposition is that social capital is beneficial for society as a whole. The resultant behaviours that stem from shared community interests, such as larger voter turnouts, are desirable as they demonstrate a heightened awareness of political affairs, thus serving to influence the wider social structure. In addition, the informality associated with social capital makes it distinctive from other forms of leisure-based social relationships. Following Putnam, Ward, Tamppubolon and Savage (2005) suggest that social networks within the leisure industry are based on 'lifestyle enclaves', especially among the middle class, who are more apt to engage in corporate forms of leisure such as gym or leisure complexes. These activities are perceived as antithetical to social capital as "they promote individualised forms of engagement and social homogeneity" (2005:405-406; Putnam, 1993:167 *cited in* Glover and Hemingway, 2005:392). In this respect, one limitation of social capital theory suggests that like television viewing, the diversionary entertainment of the internet entices individuals away from close associates and family, reducing interest in local community and regional politics in favour of global communication and involvement (Wellman, Quan-Haase, Boase et al, 2003). However, the lack of typical indicators of social capital that entail the visibility of co-operation, lack of conflict, democratic decision-making, citizenship, inclusion and contentment found in formal organisations or public space does not necessarily entail civic disengagement or detachment (Evans, 2004). As I suggest in the section to follow, the internet can act to supplement the New Zealand astronomical community by providing an asynchronous and convenient arena for groups with shared interests to facilitate existing social relationships.

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<sup>123</sup> Additionally, social capital may involve authority relations that transfer rights of control from all members to one member who may then direct the group along a specific path toward a common goal; for example, a member recognised among the informal group as 'one who gets things done' or who regularly instigates and organises the observing sessions in question.

## Virtual Performance

Of the literature<sup>124</sup> available on the networks comprising the World Wide Web, many depict computer-mediated social relations as existing within ‘virtual space’ (Sharpe, 2005), ‘disembedded space’, the ‘disembeddedness of universal space’ (Giddens, 1990), ‘non-space’, ‘cyberspace’ (Rojek, 1995), or the ‘digital neighbourhood’ (Evans, 2007). In the context of social relationships, the emphasis is on how the internet *redefines* community, as it exists ‘simultaneously, in all places at once’ (Evans, 2004). As a space that involves the “dissolution of the link between signifier and sign, referent and reality” (Rojek, 1995:147)<sup>125</sup> the term ‘cyberspace’ is commonly used to re-contextualise the linguistic referent of geographically bounded space and make it coherent when referencing the social networks it contains.<sup>126</sup>

The internet is frequently conflated with the passive consumption of popular media; a decontextualised space acting as a destabilising force that contributes to social fragmentation. Whereas traditional modernist structures and social markers such as age, gender and occupation embodied the creation of cultural meanings and values, the combination of production and information technology has resulted in cultural commodities being transformed into a mere signs; the “emptying of meaning from social life...since [this meaning] can now be copied” (Baudrillard [2000] cited in Friedman, 1994:7; Roberts, 2006:169-170). The advent of computer-mediated communication has created a peculiar state of social relations, an “admixture of codes of observing, commentating, imagining and fictionalising” (Rojek, 1995:147) in which those consuming popular media recognise it as a simulation, but nonetheless persist in simulating it; what is ‘fake’, becomes more authentic than what is ‘real’ (Urry, 1990:85). Postmodernist discourse on virtual worlds insists that there is no longer any paramount determination of identity; no ‘outside’ or ‘beyond’ the flux of parody, allegory, analogue, symbol and image, but rather an “empty meeting ground of multiple identities and plural statuses” (Rojek, 1995:148). However, most of these assertions neglect the potential for the internet to be used as a tool for the assertion and validation of values and behaviours that assist in the social production of ideas. The New Zealand astronomical community, like their overseas counterparts, have fully embraced the communicative and informational potential of the internet, having fully integrated cyber-relations into all facets of astronomy-related activities. In this section, I suggest that cyberspace can

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<sup>124</sup> A number of publications dedicated to the sociological examination of internet-based social relations have recently emerged; for instance, the *Journal of Computer-Mediated Communication* (JCMC) of the Indiana University School of Library & Information Science and School of Informatics, is “a web-based, peer-reviewed scholarly journal with a focus on social science research concerning computer-mediated communication. As an interdisciplinary publication, the JCMC publishes work by scholars in communication, business, education, political science, sociology, media studies, information science, and other disciplines.” (Abbreviated from the JCMC website: <http://jcmc.indiana.edu/aboutus.html>; last accessed 15 June 2008)

<sup>125</sup> In conventional semiotics, ‘to signify’ implies a symbolic relationship between a signifier and a *signified*. Baudrillard (2000) argues that what we consume in the late modern period are signs or representations, in which social identities are constructed through the exchange of sign-values. In this scenario, “the world is a simulacrum with no referent...we [live] in a self-conscious fantasy” (Baudrillard [2000] cited in Friedman, 1994:7, 8; Miller, 1994:81; Urry, 1990:85).

<sup>126</sup> On this topic, Rojek (1995:156) notes that as postmodern space becomes more flexible and mobile it “weakens our sense of living in situated geographic locals and increases sense of ‘universal cultural space.’...Shopping malls, leisure centres, supermarkets...[become ‘non-spaces’, and] provide the same aesthetic and spatial references no matter where in the world [you are]. “

contribute to the regulation of behaviour in three interrelated ways: (1) as a *functional space*; or a tool for amateur-professional collaboration, (2) as a *personal space*; in the form of hosted personalised websites; and (3) as an *interactive space* that hosts online astronomical communities and groups.

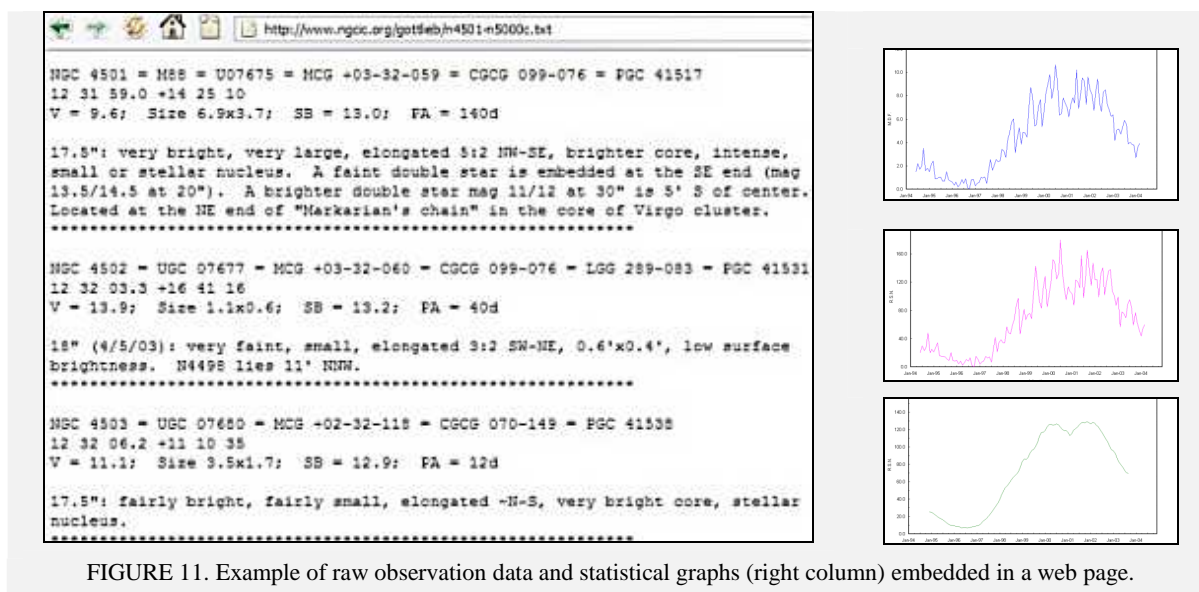


FIGURE 11. Example of raw observation data and statistical graphs (right column) embedded in a web page.

*Functional space* refers to the use of the internet as a tool for uploading data to collaborative projects; universities, shared databases or presented on web pages in plain text in HTML (Hypertext Markup Language). In addition, the internet as an information resource proves a useful tool for preparing society lectures and presentations, with the ability to collate the latest astronomy news in real-time, and compare notes and calculations with other society members.<sup>127</sup> As mentioned, informal observing groups may upload data gathered from observing sessions from an observatory site, in the field via a laptop with wireless internet capabilities, or later in the evening using a personal computer. These were seen as instrumental tools for facilitating the immediate capture and dissemination of sporadic or transitory astronomical phenomena that would otherwise have been lost “back in the old days”. Long-time observer Michael recalled that:

Around the time of Halley’s Comet, there was no [internet] network, well now if you get an aurora alert, or a meteor shower, and through these networking groups, everybody knows about it. Without the internet you’d have to ring up someone...the old phone chain, ring them up and tell them about it and hope to get it out [to others] in time...Albert Jones in the 50’s you know, he’d have to send his observations over to Britain via snail mail, it would take weeks to get there, and you get people in our group who still remember

<sup>127</sup> Those with many years of observing experience ostensibly framed their interaction with the internet in terms of ‘then’ and ‘now.’ “In the old days” was a phrase evoked in almost every discussion involving the internet; for example, as one informant described: “My favourite quotation I got from my father was “isn’t science wonderful”. The internet is such an amazing resource, I mean, you couldn’t do what you do without it. You can communicate with people from all round the world, and if you’re trying to prepare a talk...in the old days, you’d have to get books and journals.” Similarly, active observer ‘Ralph’ recalled how “one of the first pictures I downloaded when I got a computer was a picture of an asteroid, millions of miles away, and there it was on my screen...just like that. In the old days...you’d have to wait for a publication, or an official journal or something like that before you even got to see these things.”

doing that...now you can go wireless, the latest laptops are good, you see them at *Stardate*...some people have amazing set-ups.

Being networked virtually for collaborative purposes also necessitates that one be ‘socially networked’. As suggested by Kelly and Godbey (1992:322), “the demonstration of ability is at the centre of self-definition and meaning.” In this sense, the use of the internet as a functional tool for uploading captured data is recognised to others as the final link in a chain of associations with other technologies; high-end telescopes, CCD equipment, sensors or automated tracking devices. By uploading data using FTP or email, observers signify to their professional and non-professional counterparts that they are not only adept at using web-based protocols for contributive collaboration, but are also proficient in the range of technologies required to acquire information in the field.<sup>128</sup> *Personal space* involves the use of personalised narratives, images and photographs<sup>129</sup> as a scrapbook-style form of presentation directed at a presumed audience. An ubiquitous feature of the personal website is the “biography”, containing elements such as one’s life history, how they came to be involved in astronomy and the activities they engage in, as the following examples illustrate:<sup>130</sup>

<http://www.astronomywithgarry.net/interest.htm>

“I always seem to have had a passion for Astronomy. I remember looking through my late father’s 3” refractor at the Moon when I was seven years old. I was amazed by how many craters there were and ever since then it seems I was hooked. I joined my local Southland Astronomical Society in New Zealand. I also read everything I could about Astronomy, especially Sky & Telescope magazines. I talked to the other members, attended presentations and observed from home with the 3”. A few years later my father purchased a Celestron 8, which was a big improvement on the old 3”.”



FIGURE 12.

“Astronomy With Garry”

<http://astronomyguide.byethost4.com/aboutme.html>

“I have been passionate about astronomy ever since I can remember and I am currently in my second year at Canterbury University (New Zealand) studying for a Bachelors degree in science majoring in astronomy and planning to study for a doctorate...I have owned a 6 inch sky watcher reflector telescope for 6 years now and have observed and photographed many objects in the night sky. I have also been on work experience at Mt John observatory and learnt what it is really like to be an astronomer...Currently I participate in observing occultation's of various stars by asteroids to help us understand our solar system.”



FIGURE 13.

“My Interest In Astronomy”

<sup>128</sup> During an interview, an informant motioned toward a structure in his backyard, telling me: “that’s my observatory out there...it’s great, you can sit in there with the rain rolling off the roof and observe. I’ve got it fairly high-tech, it’s all set up with computers and CCD cameras and stuff for astrophotography... I also have a cloud sensor hooked up in my bedroom, so if an alarm goes off when anything comes up I can go out and change whatever needs changing...I take dates and times of star observations, do the analysis and send the results off via email to the Centre for Backyard Astrophysics.”

<sup>129</sup> These are representative of statements such as: “here is my equipment”, “here I am with friends or other society members during an observing evening”, “here is my farm/observatory/telescope” and so forth.

<sup>130</sup> Another constant feature is the ‘links’ or ‘sites of interest’ page, noteworthy for being a subtle means of expressing one’s place in a social network of like-minded individuals that extends beyond their geographically-bounded location.

In addition to life histories and narratives, the personal space used by website owners ostensibly reflects many of the traits associated with *functional* space - a demonstration of one's proficiency with equipment and enthusiasm for attaining further knowledge - by having specific pages dedicated to displaying data obtained from observing evenings. Statistics, graphs or photographic images are often made available for use and download to anyone who visits the site.

As Yoder (1997:409) notes "the development and maintenance of social worlds necessitates the acquisition and use of various commodities unique to the area of interest." With specific relevance to telescopes and equipment for active astronomical observing, in the section to follow I suggest three categories of commodity consumption presented using personal space: *accumulation*, *modification*, and *fabrication*. As expected, *accumulation* was the most common form of commodity consumption among the respondents interviewed. Some interviewees were quick to suggest their own personal websites, or sites of friends or contacts that depicted the specifications of the equipment they possessed. While many were pleased with their acquisitions, other respondents made a palpable connection between financial cost and participation in their particular social world:

[a]t some stage in the future I know I'll get a better camera, a tripod, a better scope... yeah I mean, I put my photos on my website when I can...photos of different events, Stardate, working bees, the comet [McNaught]...photos of me and my own [telescope], photos of all the [guys] and *their* stuff...some of it's really impressive, really makes you jealous! But at some stage in the future I'll upgrade all my stuff and be able to 'compete' you know [laughs]...I guess, the list goes on and on, there's lots of 'wants' but not enough money to get everything.<sup>131</sup>

Stebbins' (1979, 1982, 1992) research of amateurs suggests that the acquisition and use of expensive goods and services to participate in social worlds is practically universal across all fields and disciplines; the constant desire to upgrade to better equipment "stands ready to devour all the practitioners' time and money"<sup>132</sup> (Stebbins, 1992:56). The acquisition of high-end equipment is often seen as an investment, and



FIGURE 14. A personal webpage detailing an amateur astronomer's latest acquisition.

<sup>131</sup> Similarly, others expressed frustration that home renovations, debts or other responsibilities prevented access to acquiring better equipment: "I really wanted to get to *Stardate* but I still had my old setup you know...the bathroom needs redoing, and my wife has made that the priority...it has to come first! [laughs] So I couldn't get the scope I wanted to view [Comet McNaught] in any detail, I didn't want to just go and setup and not be able to see what I wanted to see...I could use others' scopes, but you really want to be able to do it yourself."

<sup>132</sup> Of course, the drive to participate with others cannot be divorced from the need to learn the basics first. It was highlighted to me that there remains a frequent error made by over-enthusiastic would-be-observers keen to jump into the astronomical community, of buying complex equipment and optics without first understanding the basic principles of active observation. One interviewee, in an area with an uncharacteristically high influx of new members for the local society that year pointed out that: "We [at the society] recommend that they buy a good pair of binoculars...There are areas around the



therefore, as a form of ‘active’ consumption, symbolises one’s devotion to contribution by having sacrificed financial and personal resources in order to participate in the social world to which they belong. Additionally, commodity accumulation also serves to convey a ‘professional’ image. Yoder (1997:418) for instance noted that tournament bass fishing commodity agents<sup>133</sup> actively encouraged anglers to abandon their unsophisticated “shorts and thongs” attire for a high-tech appearance reflecting that of their professional counterparts. This attitude was shared by a few respondents, one of which suggested that “you aren’t going to get anywhere with a 50 dollar telescope brought from you know, *Dick Smiths* or a retail store...they’re cheap and nasty, they look terrible...you wouldn’t want to be seen dead with one if you’re trying to do serious observing...I mean you just can’t sit there and see what others are seeing with something cheap like that. It’s just plastic...you know, a kid’s toy.”

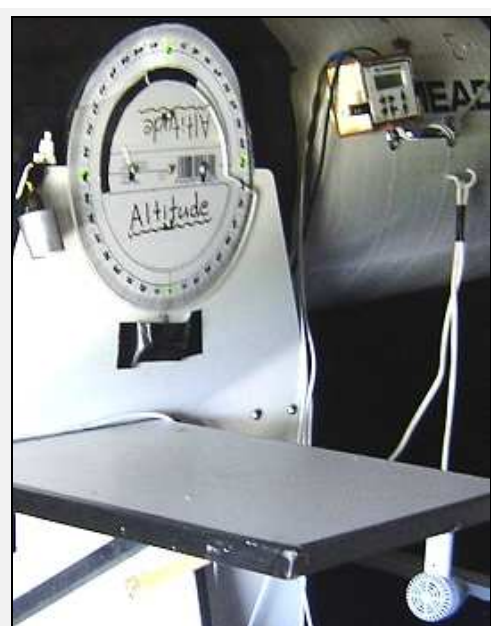


FIGURE 15. Detail showing various modifications to a ‘stock’ Meade brand telescope. Note the home-made altitude dial (top left), duct-tape, and hook with hair-dryer (bottom right).

Many of the practical amateur astronomers interviewed, particularly those involved in informal observing groups, were adept at modifying their equipment to better suit their observing needs. *Modification* involves the adjustment of timing boxes, tracking devices or gears and motors and the replacement of ‘stock’ components such as eyepieces or mounts bundled with the telescope as initially purchased. In some cases interviewees spoke of others who had deconstructed the entire telescope altogether in order to rebuild it in a new, more efficient, way.<sup>134</sup> Whenever the chance arose to view the modifications made by my informants, it became apparent that it involved more than simply attaching a new component; telescopes were often resplendent with hand-made altitude dials, plastic rulers or protractors, hair-dryers for drying condensation from optics, and were unanimously swathed in black electrical tape, used to affix or stabilise the new adjustments:

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Southern Cross, and around the Milky Way, that are better seen with binoculars and then...you can progress into getting a telescope, and use the binoculars to find your way, to learn your way around the sky...The biggest mistake people make when they buy a telescope first off is that they go for something with high magnification, and that’s *not* what you want. You want something with *low* magnification...the larger eyepiece is better, and with lower magnification you’re going to see more...eyepieces are interchangeable, that’s another important thing, you use the eyepiece that best suits the conditions for what you’re looking for, and in New Zealand, that tends to be the lowest powered eyepiece.”

<sup>133</sup> To use Yoder’s terminology, “commodity agents” are members of the amateur bass fishing community who act as liaisons for fellow amateurs in order to acquire professional or high-end fishing equipment.

<sup>134</sup> Yoder (1997:422) notes that it was common for anglers to appropriate commodities such as lines, hooks, bass-locating devices or boat-rigs into something special or unique, making physical modifications that allowed participants to use commodities in ways for which they were not originally designed. Likewise, respondents interviewed for this paper who were involved in modifying their own equipment were often extremely proud of their alterations, and in most cases would outline to me in detail what the unit could *not* do before, and explain what their adjustments meant that they *could* do now.



[On] this old Canadian show, this guy used to show you how to build things...and the secret weapon was Duct Tape, the good old Duct Tape would just fix anything...I got a little [telescope] here, a 5 inch F8...you know, the sky's moving along, so you know, moving things by a degree, you're looking at something on the horizon, it just drifts out of view...this thing, I tested it last night, you'll see this thing here stuck to the side [with tape] which will keep it fixed on the field of view reasonably well.

- Robert Rea

*Our Changing World*; Radio New Zealand, Thursday, 8<sup>th</sup> February, 9-10pm

The *fabrication* of equipment was cited by informants as being rare, though one interviewee who had spent his childhood in the United States recalled that “the thing that impresses me about New Zealand, you get a lot more builders than in the States or elsewhere...I made my own telescope when I was a kid, I ground my own mirrors. Back then telescopes were really expensive, and you saved a bit of money...but now of course, you can get someone to actually make your mirror [although] you still buy the optics...the reason for doing it though is the pride of workmanship. You go to Stardate and you see astronomers who have built their own and they're proud of them. But mirror grinding is a dying art...now it costs more to build one yourself rather than just buy one from the store.” This assertion that overseas astronomers are more likely to ‘buy’ than ‘make’ has also been supported elsewhere; for instance, a Radio New Zealand programme in February 2007 covering the annual *Stardate* meeting in Hawkes Bay contained this quote by Phoenix Astronomical Society Vice-President Kay Leather:

Everybody here who has brought their telescopes...and they show their telescopes to others...One of the joys of coming here is that sharing of knowledge...people will be able to tell you what you don't know about telescopes. The kind of expertise you've got here would make other places green with envy, because they're all out *buying* their telescopes. The guys here, they're *making* them themselves...some do go out and buy really fancy ones, “go to” telescopes which are all computerised and can find things in the sky automatically...but even if they buy it, they still tinker with them and adjust them to ‘make them their own’.

Kay Leather

*Our Changing World*; Radio New Zealand, Thursday, 8<sup>th</sup>

February, 9-10pm



FIGURE 16. A personal webpage showing the various stages of construction involved in fabricating a reflector telescope.

Both these suggestions of ‘telescope-envy’ highlights how the consumption of commodities is considered permissible, provided (a) it is apparent that a substantial degree of financial capital (and by extension, a substantial amount of personal resources and the sacrifice of other potential expenditure) has been invested in the equipment; (b) is ‘active’ in the sense that the commodity has been suitably and demonstratively ‘personalised’ and therefore *appropriated*, by investing financially in additional components or infusing it

with their own engineering expertise, effectively making it ‘their own’; or (c) fabricating the commodity from scratch, which, as its assemblage often involves the use of second-hand parts or additions, are seen as “many steps removed” from the original manufacturer or supplier. In this sense, the further removed the component parts are from the source, the more ‘homemade’ the telescope is considered to be.<sup>135</sup> This attitude finds an affinity in Bourdieu’s (1984) observation that those who consider themselves affiliates of society’s intellectual social class consciously distance themselves from the consumer-oriented bourgeois preference for vulgar opulence, preferring an ‘aesthetic-asceticism’ or an ‘ersatz display of ostentatious poverty’ that is seen to symbolically subvert passive consumerism. Sartorial affectations by dedicated active observers, such as the wearing of Swandri’s and outdoor clothing brands to the monthly society meeting, and the conspicuous modification of telescopic equipment with black tape and a multitude of “add-on’s” serve to transmit the principles and values that Bourdieu suggests reflects the “intellectuals’ taste for nature”; an active engagement with the remote and rural ‘great outdoors’ that informal observing groups habitually frequent as a part of their contributive experience. (Bourdieu, 1984:220 cited in Urry, 1990:89).

While *interactive* online communities share many of the same presentational characteristics of *functional* and *personal* space, they have the added dimension of allowing feedback on the presentation of self; a members’ images, narratives, opinions and politics posted to the boards may be scrutinised, validated or rejected - but perhaps most importantly, interactive space provides a forum in which members may seek validation for the consumption of resources associated with scientific observation.

Traditional definitions of community suggest a bounded geographical area, within which a perfect model of social interactions occur between persons who know each other (Evans, 2004; Wellman, Quan-Haase, Boase et al, 2003). However, changes arising from the last fifteen years of consumer<sup>136</sup> computer-mediated communication has seen a re-negotiation of the term to include communities that exist in virtual space. With its geographical referent increasingly thinned, a virtual community has become commonly recognised as “an aggregation of individuals who interact around a shared interest in which the interaction is at least partially supported, or mediated, by technology” and is guided by sets of protocols, policies and norms (Blanchard, 2004; Porter, 2004). As noted by Sharpe (2005:278) this redefinition means that

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<sup>135</sup> An interesting comparison was made by an interviewee on the topic of fabrication when I asked about ‘assembly kits’ (that one assembles themselves from a group of components that are pre-packaged together as one unit), available in the United States. In his view, ‘pre-made’ kits were not the same as making it yourself. Rather, assembling a ‘kit’ was viewed as more in line with *accumulation*; “like buying flat-pack furniture from the Warehouse [chain store]...some assembly required!” Similarly, others who had acquired home-made telescopes from others were immensely proud of the workmanship and effort involved, though they did not construct the scope themselves: “I own two telescopes, a 6” F12 reflector, commonly known in the group as the ‘cannon’...it’s about 2 metres long...it’s an excellent homemade telescope made by one of the other members, and when he put it up for sale I was lucky enough to buy it...The guy who put together my telescope, he was great at grinding his own mirrors and so forth.”

<sup>136</sup> Rojek (1995:147) proposes that Marxists, taking it as axiomatic that capital reduces everything to monetary value, stress the “entrepreneurial culture” involved in cyber-relations as “the connecting link which encourages consumers to appropriate the commodities on display.” However, Rojek suggests that “the somnambulant quality of cyberspace provides a ‘non-place’ that offers a comforting, dream-like admixture of codes in which buying and selling is not necessarily paramount...[in this context] the old modernist categories are no longer viable frames for organising social practice.”

community is now better identified as “an experience, rather than a place. Simply put, community is where community happens.” The proliferation of these online communities has been linked to their ability to fulfil specific and unique needs for their members; enthusiasts in a specific field will often use a chat room or multipurpose website to share knowledge, experience and products on subjects ranging from parenting to soap operas to software problems to careers.<sup>137</sup> More importantly however, and of specific relevance to amateur astronomers, social and organisational virtual communities provide opportunities to exchange help, information, and support in order to influence others (Blanchard, 2004).

One aspect of interactive space useful to the New Zealand astronomical community is the ability to create a virtual meeting ground with its own norms and hierarchies that exists in parallel with the physical space of the society meeting, complete with a ‘committee’ in the form of forum moderators and long-time, regular contributors. Announcements can be made regarding upcoming talks and presentations from RASNZ, local speakers or other groups of interest; recent events that didn’t make the local society newsletter can be added or expanded upon, and reminders about upcoming meetings and events can be sent in tandem with group email lists. In addition, chat rooms can be useful to rally support for causes - for instance, for anti-light pollution dark sky projects - or to quickly and efficiently share complex, technical information (by directly ‘cutting and pasting’ from other websites and embedding data or schematics in messages) that is otherwise absent in a face-to-face setting.

Where the replication of the physically-situated society meeting diverges however is in the ability and frequent use of the virtual community to share and receive validation for personalised visual representations of astronomical activities in an interactive setting. As noted by Stewart and Floyd (2004), photographs are particularly powerful devices for communicating a broad range of ideas, and provide a sequentially ordered framing device for stories leading up to, during and after the recording of the image. Images can act as both reflections of an idealised self (for instance, as proof of observations or a representation of contributions to science) and as a dominant narrative representing normative visions of behaviour (2004: 450, 447). Aside from regularly contributing advice and opinions to interactive message boards such as the Yahoo™ *nzastronomers* Group or the Google *NZ AstroChat* community, the majority of my informants were also fervent contributors of images to these and other online groups:

Every now and again I’ll send [my friends] a photo that I’ve taken that I think is quite nice, because I’ll normally post them off overseas, and there’s the ‘Yahoo’ groups, the ‘Big CCD’ group, basically you submit photos or submit a URL link to that photo, and people have a look and send comments back, or give constructive criticism, and I’ll send a few out to my mates and get some feedback you know, and

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<sup>137</sup> Of interest on this topic is Bargh and McKenna’s (2004) assertion that the anonymity of internet chat groups encourages the potential for expressing the ‘true’ self, or those aspects of one’s personality that people feel they cannot articulate in face-to-face social interaction. Talking to others in cyberspace, often with those separated from one’s self by large geographical distances, has the potential to facilitate a deeper social bond than those interactions conducted in the real world; the absence of physical and non-verbal cues - for example attractiveness or bodily gesticulations - leaves room for the formation of relationships on deeper, more meaningful levels - such as shared values and beliefs (2004, 582, 586).

I've had them out star-gazing on the odd night, get out the telescope. And they're always interested in what I'm doing, and they know what I get up to, and they're right behind me...so yeah, it's good.

In this sense, the ability to engage in astrophotography and produce high-quality images of astronomical phenomena serves as a conscious demonstration of proficiency that can be judged by others in the community. During an interview with avid astrophotographer James, he took me aside and explained to me the way CCD (Charge-Coupled Device) cameras work, and why it was a superior method of astrophotography compared to standard digital images:

A friend of mine used to take glass plates, black and white images, one through the red, one through the blue, one through the green and then combine them to get the true colour. Some of the newer digital SLR cameras, they're not that sensitive to red so you don't get the true colours you know. You've got your colours [*pointing to the images*], the oxygen, the hydrogen and so forth...there's Antares [*the star*] there...I thought this was ghosting originally [*pointing to a patch of green in the top right corner*] but I think that's...that's actually a patch of nebulosity over there, I'd like to photograph that with the 16" telescope...even that one there...and this was just with the 200mm lens. So yeah...I was quite pleased with that one.

James' comments also highlighted, like the informants involved in informal groups discussed earlier, how demonstrative acts of proficiency also require *active consumption*; the acquisition of commodities and equipment that serves as an indication of one's dedication to the process of contribution:

I can take photos of the stars and during the daytime I can look at my photos and you're seeing the night basically, and slowly it, it developed from there, then onto film, and then into digital SLR cameras, and now I've got a charge-coupled device, a big CCD camera, it's worth quite a lot of money...you can just pick up so much more on film or CCD than you can visually, bringing out the fainter stuff. It's just been a, basically a, progression you know. I get a great amount of delight from just showing people a photo of something...for example, that one there [*points to a photo on the wall*]...that one was at an astronomy camp out in Taupo, and that, people just love that photo [*the image is of three figures and their telescopes silhouetted against a twilight sky*] and, I just like that buzz you get when people see a nice photo...it was one of those shots, we were on a farm out above Taupo, and it was one of those photos where you see those guys lined up against the skyline, you wander up with your tripod and 'click', about a thirty second exposure or whatever, looked at it in the back of the camera and 'whoa', that's a nice shot.

Informant David, also a keen astrophotographer, expanded on James' comments in explaining:

What you see on the NZ [Yahoo] Astronomer's group is, they have a competition, and [the moderator] puts them into categories, and you can vote for the one you want...there's different categories each time like galaxies, stars, comets and things, and...everyone puts up the information to do with how they took the photograph, exposure, time and what camera they used...and you'll see that on the group they talk about the latest CCD cameras, 'how do I connect up my USB with this type of camera?', and that sort of thing.

This sharing of technical information related to individual proficiency also shows how online communities, such as the aforementioned Yahoo™ *nzastronomers* Group, are unique in that they “follow patterns of civic engagement and socialisation” that continue offline. Evans (2004) and Porter (2004) suggest that rather than isolating individuals from the wider community, the internet and virtual technology enables individuals to mobilise and “maintain membership in numerous communities in which they have unique identities and social relations” (Wellman, Quan-Haase, Boase et al, 2003). To this effect, relations conducted within interactive space can continue offline, and participants can use these online feedback ‘markers’ as useful tools for judging the like-mindedness and ability of other astronomers as potential additions to an existing social network:

Last year I went to Gisborne...and *Stardate*, which happens every year in January, that’s everyone from the North Island congregating in Hawkes Bay together, so quite often you just see posts on the NZ Astronomers [Yahoo] Group, and there you get to meet the person behind the email...you see them post messages on NZ Astronomers...you go to *Stardate* and meet the people behind the images and photographs, and quite often, it’s like “oh, so you’re Andy, I’ve seen your photographs”, so you get to know people as well, it’s quite good like that.

### **McNaught revisited**

At the end of the section concerning the Comet McNaught phenomenon, I stated that this chapter deals with “the methods employed by those who, at some point, have recognised that an over-reliance on external stimulation is not enough, seeking instead to engender a sense of appreciation for the science of active observing by encouraging it in places where it matters most - among the social networks of their own backyard.”

As a means to an end, constructing normative behaviours that appeal to categories concerning what is ‘virtuous’ and what is ‘deviant’ is not just about changing the identity of individuals within the immediate New Zealand astronomical community, but the identity of the *entire* New Zealand astronomical community. The pragmatic result of moral regulation is that astronomy is conflated with active contributions to science. More so however, this means that in eyes of the general public, astronomy is identified as an activity that is irrevocably associated with *action*. Earlier in this chapter, I referenced the attitudes of some informants who lamented the lack of active observers in their own local society, for instance:

Yeah, I was sixteen when I [joined]...there were just more people, and they were younger, they weren’t all retired...they were active observers and they were quite ambitious, and when I came back in 1997 there was nothing at first, and it was like “well we’ve been in recess for 11 years”, they had just got tired of listening to the same people in the same group talking about the same stuff to each other. It was really bad.

Likewise, informant Harold recalled that “in 1969 or 1970...there was more people...involved in the whole thing...I mean there’s a lot of grey-haired people, and the senior membership is all past and present scientists or academics, most of them worked at the Cawthron Institute, the DSIR or NIWA.” In one respect, this holistic approach to combining academic and practical action reflects attitudes by practical astronomers that pre-date the original Royal Astronomical Society of New Zealand. While astronomical research was originally the domain of the affluent ‘Grand Amateurs’ of Victorian Britain, the increasing prevalence of an eclectic middle class in the late 19th century saw a different type of astronomer develop; bands of clergymen, lawyers and physicians, who formed their own independent societies with an emphasis on prolific observation that eschewed the predominantly academic approach of their highly-educated contemporaries (Chapman, 1999: 120, 448). As a template for future technical and social developments, astronomical science among amateurs was renegotiated and perceived as necessitating the incorporation of active *experience*, through which discoveries could be made, fine-tuned by the affluent educated, and properly validated in scientific publications that contributed to a wider pool of knowledge and understanding.

To this effect, if members of the public wish to join their local society and become a part of the wider astronomical community, they join a social framework in which active astronomy is effectively *normalised*. New members are then obliged to assimilate these values and norms, and thus join as practical, active observers as opposed to simply joining and becoming passive consumers of information. While this ensures the survival of the group and their contributive endeavours, it also ensures the survival of the reciprocal knowledge networks that enable amateur astronomy to exist in the first place.

### Conclusion:

#### *Performativity and Praxis: Amateurs, Astronomical Communities and Contributive Participation*

As a leisure activity, astronomy provides a means for amateurs to engage in a structured network of social relationships, some of these involving collaboration with professionals, that enable them to make personal contributions to science and thus assist in producing knowledge that furthers the activities in which they participate. While some members provide assistance to their local astronomical societies in the form of subscription fees and theoretical discussion, the categorical distinction made between ‘practicals’ and ‘armchairs’, the latter seen as ‘consumers’ of information, suggests an anxiety by contributing astronomers concerning the perpetuation of astronomy-related knowledge.

As a response to the concerns outlined by my informants, practical astronomers engage in behaviours that I suggest constitute a form of moral regulation. This type of regulation is commonly associated with state-funded attempts to change human perceptions and attitudes regarding what is considered ‘virtuous’ and what is considered ‘deviant’ by encouraging activities it deems beneficial to society. The principal weakness with these theories is that they consider the State the pre-eminent force in regulating behaviour. Following a reformulation by Ruonavaara (1997), I suggest that moral regulation can also function within dense social networks. This approach also reflects the Weberian concept of *lebensführung*, or a ‘conduct of life’, which involves the redefining of how people view themselves in the course of everyday social relations. In addition, Giddens (1990) theory of structuration proposes that individual social action can affect structure while acknowledging the constraint structure has on agency. Individuals can reflexively recognise the effectiveness of routine actions in maintaining social order, and can reproduce that order by ongoing participation in patterned social practices (Giddens, 1984; Harvey, 1990; Kuentzel, 2000:87). These practices, I suggest, constitute a form of performance (Goffman, 1957, 1974; Stebbins, 1979; Kelly, 1983:100; Kelly and Godbey, 1992:323) in which informants morally regulate contributive participation through demonstrative actions that provide ‘idealised templates of behaviour’.

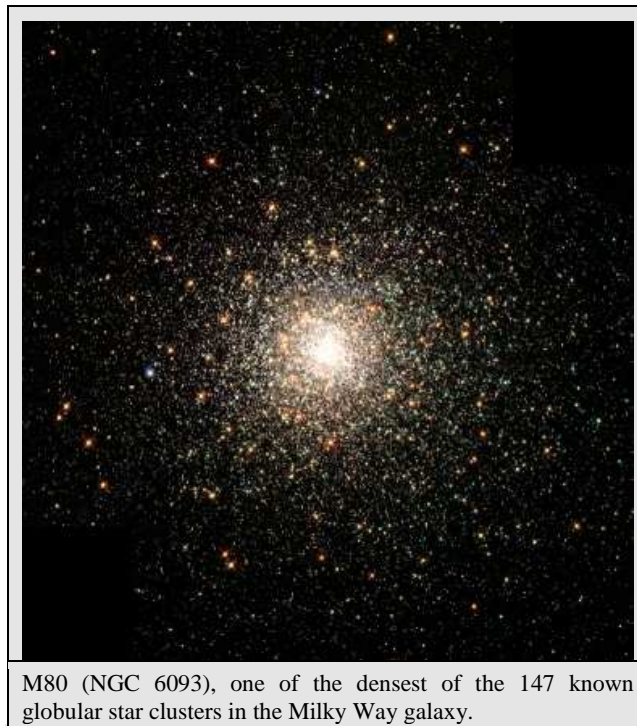
The principal methods for conveying demonstrative action involve the processes associated with amateur-professional collaboration, informal active observing groups, and the sharing of narratives and visual references (self-referential photographs or astrophotography) with others in social settings and virtual online communities. The formation and maintenance of informal observing groups (IOGs) is particularly significant, in that by making contributions to collaborative projects that culminate in reported discoveries, these groups can, by association, marginalise attitudes of passive consumption and perpetuate the view of their local society as prolific contributors in the eyes of the wider astronomical community. Likewise, as a functional tool for uploading captured data to collaborative projects, the internet has the benefit of allowing for long-standing demonstrations of proficiency. The ability to present examples of collected information, the conspicuous consumption of commodities and photographic evidence of participation, either in observational situations or using astrophotography to elicit constructive criticism, provides an

interactive forum which simultaneously asserts identity and reinforces the distinction between contribution and passive consumption. Strategically speaking, moral regulation is concerned with constructing normality via *persuasion* as opposed to *coercion*; a redefinition of the values, ideas and perceptions intrinsic to self identity. In this sense, moral regulation involves a movement from external constraint to self-discipline, seen as necessary for the goals of a wider social project: by “voluntarily keeping ourselves in order, morally and socially...the moral and social order of [modern life] is cemented” (Rojek, 1995:44). This idea of social order, its importance to my informants and the underlying principles that motivate it is further examined in Chapter 3.

While the actions involved in regulative behaviours are primarily for the benefit of the astronomical community, the social reproduction of concepts relating to active observation also contribute to the perspective of astronomy of those on the ‘outside’. While useful for ensuring that potential ‘insiders’ are socially obligated to follow the conventions associated with normalised behaviours, the image of the astronomer engaged in an active communion with their telescope under a black rural sky is particularly advantageous when engaging with the general public for the purposes of education - as I will examine in next chapter.



## Chapter 2



## *Cosmological Communitas:* Public Education and Social Reproduction

Image credit: *NASA Public Domain image*  
GRIN DataBase Number: GPN-2000-000930  
Image # : PR99-26  
<http://grin.hq.nasa.gov/index.html>

### ***The Bunker***

*It's 10.30pm in the bunker, and Michael is balancing precariously on the edge of the ladder 2 metres off the concrete floor, adjusting an eyepiece on one of the three 'light buckets'; a home-made reflector telescope some 4 metres in length. Stephen steadies the base of the ladder with one hand and fumbles in his pocket with the other, eventually producing another eyepiece that he holds above his head.*

*"Try this one."*

*"Ahh...yeah hang on – uh...what are we looking at? Were we doing Jupiter or Omega tonight?"*

*Michael starts unscrewing the eyepiece. The magnification is important; for closer, brighter objects such as Jupiter, Stephen's replacement eyepiece is suited to making the distant speck in the night sky come alive in detail, allowing the group milling around just outside the bunker walls to see the bands of cloud on the planets surface when they finally venture up the platform and peer in.*

*"Weren't we doing Omega with this one tonight? I already moved it...uh, well we could change..."*

*"Hang on uh...no, no we can use the tube for Jupe, you go ahead – it'll be a bit smaller though."*

*"Should be alright...uh, bugger it, wait a minute – hey, what was the ap [aperture] on that other one Steve? Hey, do you want to start bringing them through now? I'll be done in a minute."*

*Despite it's militaristic epithet, the 'bunker' is in actuality a stone-walled observatory built into the side of a small hill overlooking acres of farmland; the only hint of the sprawling landscape is a collection of jagged shapes silhouetted against the distant horizon by the faint orange glow generated by the town centre 15 kilometres away. Fortunately, the moon is absent this evening, rendering the landscape a perfect pitch black. The only indication of a pathway to the bunker is the steady crunch of gravel under foot as tonight's group of interested 'publics' and would-be amateurs mill around the exterior, gazing upward and pointing out what constellations they know from memory. Inside, the bunker's interior is swathed in red light; any other light is forbidden as it interferes with the eye's ability to adjust in the dark environment needed to properly view (and appreciate) the sky overhead. Inside the doorway a small handwritten sign proclaims "No white light! All cellphones and torches MUST be switched off – no exceptions!" Scrawled in black marker with its peeling edges covered with sellotape, this DIY touch to the bunker's otherwise streamlined aesthetic provides a counterpoint to the professionally laminated and evenly-spaced posters of the solar system and other astronomical phenomena that adorn the gray stone walls.*

*Tonight's congregation comprises many who are retired; some of the more elderly spectators require a steady hand to assist them over the concrete step leading into the doorway. As they shuffle inside, the remainder of the group – dominated almost exclusively by men in their late forties and fifties, some engineers or self-styled DIY enthusiasts – gravitate toward and assemble around the electronically guided "go-to" telescope and begin to subject Michael, who has since made his adjustments on the light bucket and pointed it toward the "Coal Sack" in the Milky Way, to a barrage of questions concerning its functions and inner workings.*

*"We don't really get that many young ones out here" Stephen admits to me despondently as he surveys the group. "We'd like to get some you know, sort of [younger] guys along. I mean at the meetings you sometimes get interest there from the ones who see the ads in the paper or whatever, but getting them out here to actually do the observing is difficult...you know, they'd rather be going out with their mates or watching TV on a night like this, which is a real shame 'cause they're really missing out on some amazing stuff."*

*It is on that note that the phrases "wow!" and "that's quite spectacular, isn't it!?" are bandied about frequently by this evenings collection of observers, although the tone alternates between a genuine, naïve fascination at things previously unseen and a polite restraint at one's own disappointment. The questions start to arrive with increasing frequency.*

*"So why is it black and white? I expected to see some ah...some blue in there?"*

*"Well, it's quite far away..." Michael explains to the fifty-something man in the grey woollen jumper. The man's face is twisted with concentration as he balances on the ladder and squints into the reflector's eyepiece. Omega Centauri, or NGC 5139 - a large globular star cluster just north of the dark region of the Milky Way band known as the 'Coal Sack' in the constellation Centaurus – appears to the observer as a dense, spherical ball of bright dots emanating outward from a single point, the outermost edges appearing slightly warped by the barrel distortion that comes part and parcel with larger 'light buckets' such as this. "The human eye can't process anything other than blacks and whites and greys at this distance." Michael has turned to address the group now as he speaks, the man's question having provided an opening for a somewhat chaotic discussion of active observing.*

*"You see just up there...yep, just off to the right where Stephen's pointing...yeah that's it...that's basically a huge cloud of dust where new stars are formed, and some of them potentially have their own systems...sorry, what was...[how many moons?] oh you mean planets? Well so far uh...astronomers have discovered about 250 or thereabouts...most of them are gas giants like Jupiter and Saturn, and there are some icy ones too...[habitable?] Uh not sure about that one...Has anybody here heard of Grant Christie*

*or Jennie McCormack?...[“I think I saw them in the newspaper” says a woman toward the back, as if answering a pop quiz] Yeah that’s right...they helped discover a new planet a couple of years ago...they were a part of a network of observers like we are here...[“What’s it called again?” a male voice asks] well ah...it doesn’t actually have a name yet, the official designation for it is OGLE-2005-BLG-071...Does anyone know what gravitational microlensing is?...[No response] No? Well, if you follow my hand movements, what happens is this...”*

*As Michael continues his attempt to instil the audience with a sense of appreciation for all that can be found in the night sky, Stephen has made his way to the back of the bunker and is lining up one of the older scopes to view Jupiter – a ‘local body’ that is not only easy to find, but is more familiar to the untrained eye and hence it is hoped, more open to appreciation:*

*“Sometimes the old proverbial [sic] gives off a better, you know, a better idea of showing how close these things are, you know, compared to other things we might look at.” Stephen explains. “If they can see something that’s...kind of in their own backyard you know, then you’d kind of hope that they might be motivated to go out and get a scope, or even some binoculars and start going out at night to try and find stuff. You need a catalyst or something that makes you, you know, just think ‘wow, I’d like to see that again’, but in your own time and by yourself, when you’ve got more time to appreciate it...It’s good to do it in the group, which is why we do this, like this thing tonight when it’s clear...you get everyone [getting] excited about it and they can talk about it and hopefully, you know, take it a little further...”*

*Stephen’s assumptions are correct for the most part: the sight of a slightly fuzzy Jupiter with its pin-prick satellites suspended in the blackness of space is a visually impressive addition to the evening, and generates enough ‘buzz’ among the congregation that Michael confides to me that the evening has been a suitable ‘success’ and ‘worth coming out for’. With the eyepiece of the refractor telescope at a suitable head-height - compared to the ladder-only access of the ‘light-bucket’ – even the most elderly of participants at tonight’s viewing session can line up uniformly and one-by-one peer up through the tube and take in the sights.*

*“Do you find...have you discovered any comets or black holes or anything like that?”*

*The question from the man in the Kathmandu jacket (estimated to be in his late thirties, one of the youngest in tonight’s group) is a good one, and immediately prompts Michael to enthusiastically impart his discoveries of variable stars to those assembled around the Jupiter scope. The small crowd listens intently to every word – as someone who has ‘discovered’ something (even though it’s a ‘something’ they don’t*

themselves fully grasp at this point) Michael - and indeed the immediate observatory environment - has suddenly become something more than a simple case of eccentric stargazing for stargazing's sake. Michael later relays to me that he should have opened with his stories earlier: "When people realise that you are actually contributing something, it makes it, more real for them in a sense you know, not just a hobby. I mean, for us it is...well it is in that way that we like doing what we do, it's not like getting up and going to work in the mornings you know, not that I don't like my job...but what I mean is I guess is that...it's more serious than that. You have to take it a bit seriously if you want to assist or contribute something." Michael's anecdotes are expanded to include his participation in New Zealand's array of observing networks, the crowd digesting nonsensical acronyms such as CBA<sup>138</sup>, OGLE<sup>139</sup>, and MicroFUN<sup>140</sup> as Michael briefly explains each one in turn, their relationship to networks in other countries ("We had an astronomer from Chile visit here a few months ago!") and how "even You" can assist in making discoveries with a telescope, a pad and a pencil. As Michael trails off and the last few mill around the scope to view Jupiter, a voice pipes up from the rear of the bunker:

"Now, does anyone here own a telescope or have access to one?"

With the observing evening nearly over, Stephen has started his pitch for extending tonight's experience – the astronomical society has a collection of scopes for rental, a couple of old refractors for sale, and an email address on standby for a local manufacturer and importer of short reflector scopes. While Michael attends to a small group of interested stargazers, Stephen scribbles details on a piece of paper for a middle-aged couple and announces that they will be holding a practical lecture on telescope calibration and maintenance next month.

"And if you have anyone who might be interested, yeah, feel free to bring them along. No no...no 'official' fees. Well if you want to join that's fine, there is a small...oh, donations are ok yeah, we generally just prefer if people are going to attend regularly that people give something to help with the maintenance of the observatory. You can rent the scopes too if you want to take them home with you and do some backyard – ah, well, most likely not with the lights in town, but you can definitely see Jupiter. The moon is a good one for a small scope...if you want I can email you some more details..."

The hour is growing later, and the conversation has started to shift from the astronomical to the mundane; all those who have shared in the evening's viewing experience introduce themselves to others, exchanging personal anecdotes on past work experience and answering questions on how they came to be present this evening. The odd telephone number and a promise of a phone call is exchanged. Michael, who has since

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<sup>138</sup> Centre for Backyard Astrophysics

<sup>139</sup> Optical Gravitational Lensing Experiment

<sup>140</sup> The Microlensing Follow Up Network

*finished his discussion with the small group of enthusiastic converts, sidles up to me as I surreptitiously scribble away in my notebook and asks if I've noticed anything interesting. I make a bland remark that the shared observing experience seems to be a good tool for drawing people together in discussions about what they've seen. "Yeah they'll probably come back next month," he states happily, "there's a couple that were really into finding out some more so I've sent them over [to Stephen] to sort out a rental for the next few weeks. I mean it's pretty inexpensive really so at least they get some of that [experience] before they show up for the next meeting. Hopefully they'll want to join up or just come out a few more times." While this is an accomplishment in itself, Michael is mildly disappointed that the 'real' converts – those who take it to the desired level of involvement - only come along once in a blue moon: "The only thing that's...that isn't too good is that they'll probably not really get to the stage where they're joining up with the OGLE [observing] project or a network or something like that, you know, because they're older and they prefer to be comfortable at home on these nights...nights like this are good for, you know, getting them interested, and it's a social thing which older people are into, maybe they'll be at the meetings you know...it's a good thing having a bit more understanding of astronomy, but I can't see them getting out there [to observe] that much...It's still good though to have them out there if we can, the more the merrier, the more people out there with scopes the more you cover [the sky] and there's always the chance that someone might spot something, even if it's just something local in our solar system like a comet or an asteroid maybe."*

*It's 12.15am, and the local astronomical society's public night is over for another month. Back out in the open air, as cellphones are switched on and the gravel path becomes illuminated by torchlight, the subject of discussion swings back to the astronomical. The bracing rural frost and wide open sky has disconnected everyone from the cloistered security of the bunker, and the evening's shared experience provides a conversational contingency to break the calm that concludes the suddenly discomfited exchange of personal information between strangers:*

*"Did you see the moons? I could see three of them...Hmm, yes just the three – oh, you saw another one? Where was it? Oh just over by the right side there? I missed that one!"*

*"Those clouds were amazing weren't they?...Did you see them?"*

*"Do you think you'd be able to see Saturn? Ah well...well I'll have a think about it...we'll give it a go next week, do you think you'll be free? Righto I'll ring you then...safe driving!...Cheerio, bye..."*

*As a steady stream of car headlights weave away in the distance, Michael returns to the bunker and makes his way to the 'light-bucket' as Stephen goes off to brew some coffee. After a few adjustments, Omega Centauri reappears and Michael sits atop the ladder with his eye firmly affixed to the eyepiece, a laptop*

*computer and pad and pencil at his side. He idly jokes that he's hoping for a decent brew [of coffee] from Stephen this time as "it's normally just that granulated crap [he normally makes] and you need something 'real' to keep you awake." However there's also serious inflection to Michael's tone. There's at least five hours of decent dark sky remaining and the public night has cut into a good three hours of quality observing time.*

### **Cosmic Tourists**

In Chapter 1, I discussed how practical amateur astronomers attempt to morally regulate an ethic of contributive participation in order to encourage active observing and strongly associate New Zealand's astronomical community with contributions to science. Following this theme, I now wish to turn to the subject of education; specifically, how members of various astronomical societies attempt to communicate ideas regarding astronomy and science to the wider New Zealand community.

Astronomical societies are by no means insulated nor exclusive, and regularly allocate society resources for the purposes of interacting with and educating the general public. The goals of the original Carter Observatory – “to conduct research, to assist in the preservation of New Zealand's astronomical heritage and to provide astronomy education to the public” (Orchiston & Dodd, 1995) – reflects the didactic philosophy of smaller societies, who supply local volunteers to open up a community or private observatory for interested parties on designated evenings. As informant David described to me:

I'm out the observatory most Tuesday nights, we try to have it open for the public as much as possible...I really do enjoy it, I like going along and chatting. I suppose it's also a social thing...we're out in the middle of the dark watching stars every Tuesday night talking to different people...we get quite a lot of overseas people coming up to have a look. There's always something interesting happening, some interesting people coming along.

While appearing as superficially informal or casual, this educational experience is nonetheless entrenched within a wider context of social relations that involve astronomers permitting the general public to explore and interact with resources that one would find otherwise difficult to access. During my fieldwork in 2007, I participated in a number of public evenings organised by local astronomical societies at observatories around New Zealand. My first impressions of the experience were slanted toward a focus on local societies' attempts to maintain membership numbers. In this context, 'casting a wide net' was suggested by informants as necessary for recruiting potential affiliates to the local society. For every ten, twenty or more attendees, two or three may show a level of genuine interest sufficient to become a paying subscriber that helps keep the club operational. However, it soon became apparent that what I was witnessing was more akin to what Urry (1990) describes as 'the tourist gaze' - individuals and groups consciously seeking out and partaking in the experience of an authentic, communal discovery; a 'pilgrimage' to find the answers to just how those extra-solar planets were discovered, or just where those latest images of Saturn, Jupiter and

Comet McNaught in the media came from. Perhaps more importantly, people are interested in *who* is doing the discovering – or at the very least, *how* they do it.

From this perspective, the application of contemporary tourism and leisure theory (MacCannell, 1976; Urry, 1990) are particularly useful in examining how local astronomical societies use educational nights to instil positive associations between science, technology and nature, whilst attempting to facilitate a realisation among participants that they can exercise their power to make decisions that benefit the broader goals of astronomy in New Zealand.

Urry (1990:8) and MacCannell (1976:101) suggest that contemporary tourists are engaged in a search for authentic experiences outside of the normal sphere of everyday life, times and spaces. The observatory, with its overt display of ocular technology, star charts and humans possessed with esoteric technical knowledge, elicits what MacCannell (1976) describes as a *staged back region*; a ‘living museum’ that conveys an image of authentic processes at work. In this space, visitors are able to glimpse the life of others engaged in the manufacture of realities external to their own, a situation indicative of a ‘postmodern touristic consciousness’ (MacCannell (1976:99). This consciousness involves a shift from norm-enforced and socially encoded classes of ‘truth’ and ‘non-truth’ toward a dichotomous social redefinition of ‘truth’ and ‘reality’, detaching traditional forms of everyday life - the mundane and the habitual - from their roots and transforming them into cultural productions and experiences<sup>141</sup> that are consumed by individuals and groups (MacCannell, 1976:91, Stokowski, 1994:23).<sup>142</sup> Urry, utilising Foucault’s concept of the ‘gaze’, suggests that:

the ‘gaze’ in any historical period is constructed in its relationship to its opposite, to non-tourist forms of social experience and consciousness. What makes a particular tourist gaze depends on what it is to be contrasted with; what the forms of non-tourist experience happen to be. The gaze therefore presupposes a system of social activities and signs which locate the particular tourist practices, not in terms of some intrinsic characteristics, but through the contrasts implied with non-tourist social practices, particularly those based within the home and paid work.” In this sense, even familiar activities take on “particular significance if they take place against a distinctive visual backcloth. The visual gaze renders extraordinary, activities that otherwise would be mundane and ordinary. (Urry, 2002:1-2, 13)

The importance of this change in relation to modern leisure stems from its impact on the nature of interpersonal relations and the way in which they are reproduced in the context of the tourist experience.<sup>143</sup>

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<sup>141</sup> MacCannell particularly singles out the contemporary fascination for occupational exhibits as ‘perverting of the aim of leisure’ since it involves a return to the workplace (MacCannell, 1976 cited in Urry, 1990:9, Stokowski, 1994:23)

<sup>142</sup> In this instance, it is suggested that ‘work lives’ – those tenets of contemporary existence not privy to intrusion and observation by the casual outsider – are of particular interest to the modern-day *flâneur* for whom monetary vocations are a “mere attribute of society and [no longer a] central feature” (MacCannell, 1976:58; Urry, 1990:9).

<sup>143</sup> It is important here to make a distinction between the kind of ‘staged back region’ MacCannell implies embodies the contemporary tourist experience, and the type of atmosphere presented for consumption by the public on public nights. The distinction in question is economic. For incorporated societies operating under the auspices of legislation that vetoes profit,





FIGURE 17. Collection of reflector and refractor telescopes used on public nights, framed against an extensive collection of images on the rear wall. New Plymouth Observatory, New Plymouth.

In the case of the observatory, what is presented to the public is the same environment that astronomers themselves engage with, interact with, and utilise for the observation of astronomical phenomena. There are no ‘fake’ telescopes or ersatz star charts on display. However, the heavy presence of photographic images in the observatory or adjoining entrance - posters of galaxies, colourful nebulae or images of amateur astronomers and their telescopes - does serve to create a suitable ambience or ‘communicative staging’ that heightens the sense of the space as an

authentic place of work imbued with a scientific legacy (Arnould, Price and Tierney, 1998 cited in Sharpe, 2005:268). What is most important in distinguishing the back region from the “everyday” is the changing and transforming of social space, as opposed to a literal staging area that has been constructed for consumption and entertainment. MacCannell makes an allusion to this type of transformative social space in proposing six stages of a ‘touristic continuum’, of which the first stage – an explicit and overt ‘front region’ – is gradually peeled away and revealed to outsiders by those engaging in the fourth and fifth stages; those areas “cleaned up and altered a bit because tourists are permitted an occasional glimpse in” (1976:101-102). The sixth stage of MacCannell’s continuum most closely resembles the type of touristic space employed by my informants - “a *real back region* which is the kind of social space that motivates touristic consciousness” (1976:102; my emphasis) - the observation of, and participation in, the interpersonal relations of insiders immersed in another kind of reality.<sup>144</sup>

Public nights at an observatory are meant to be full of wonder, encompassing the “virginal sensations of discovery” associated with being ‘half-in and half-out’ of an institutional space normally reserved for those engaged in realities external to the normality of everyday life (MacCannell, 1976:99). In order to foster a successful experience for visitors, volunteers must employ a series of subtle techniques for engendering the desired associations, as well as ensuring that the overall experience is positive in character. The concept of *communitas* (Turner, 1969) is particularly applicable to the type of transient social solidarity sought by public night organisers in their efforts to stimulate interest in astronomy.<sup>145</sup> *Communitas* is said to be

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the lack of a revenue-gathering imperative provides a sharp contrast to the types of staged back regions one might normally associate with touristic forays into manufacturing, industry and other consumption-oriented work-lives of interest.

<sup>144</sup> The difference between the ‘real back region’ and the efforts of local volunteers in providing access to the inner workings of the observatory lies primarily in the way these interpersonal relations are conducted in public and private space for the purposes of stimulating interest toward a specific feature of the ‘work’ being undertaken.

<sup>145</sup> While Turner’s early work revolved around *communitas* as it was to be found in the obligatory participation associated with tribal or communal rituals and an adherence to a greater social collective, his later work examined contemporary forms

‘existential’ or ‘spontaneous’<sup>146</sup>, and materialises when “people step out of their structural roles and obligations and into a sphere that is decidedly ‘anti-structural’...people [become] ‘betwixt and between the categories of ordinary social life’ and the rules of everyday life can be altered, inverted and made topsy-turvy” (Turner, 1969:132; also 1974:273; Fernandez, 1986:178-179; Sharpe, 2005:256). Turner (1982:48) summarises the social characteristics of *communitas* as involving

personal honesty, openness, and lack of pretensions or pretentiousness. We feel that it is important to relate directly to another person as he presents himself in the here-and-now, to understand him in a sympathetic way, free from the culturally defined encumbrances of his role, status, reputation, class, caste, sex or other structural niche. Individuals who interact with one another in the mode of spontaneous *communitas* becomes totally absorbed into a single, synchronised, fluid event.<sup>147</sup>

As people are ‘between the categories of ordinary social life’, *communitas*, in the context of contemporary tourism and leisure, is seen as indicative of a liminoid experience (Turner, 1982). Very early in the evening, participants sense that they are *all* beginners, and the shared experience of ‘knowing nothing’ to ‘knowing something’, outside the realm of ordinary daily life, provides a catalytic event that stimulates cordial group discussion and individual reflection. The importance of nurturing this state of self-reflexiveness is that it assists public night volunteers in creating new and enduring associations; allowing participants to step outside normality and freely critique social and cultural rules otherwise taken for granted in the everyday world (Urry, 1990:8; Fernandez, 1986:178-179). Informant and volunteer Michael offered the following explanation:

It’s just...getting people to think a little bit, you know...to make that connection between [*motioning upward*] “‘oh wow, that’s cool’ and ‘how does this affect all of us’”, that sort of thing...I have my own theories about people...People are just more open to ideas when they’re with other people because they can see *them* doing things, you know, ‘oh look, if she can do that, well I probably can too’...they start to get confidence you know, and someone will ask a question and someone else might know it, or has read it somewhere, so they speak up and suddenly everyone’s talking at once...it’s really cool. So you try to encourage that...

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of “transient togetherness” found in the “play and choice [and] entertainment” associated with the “permanent anti-structural settings” of leisure activity, in which one’s involvement may comprise total immersion, negotiated attendance or complete avoidance (Turner, 1969, 1974; Turner, 1982:43 *cited in* Sharpe, 2005:256-257).

<sup>146</sup> Turner (1969:132) makes a clear distinction between three types of *communitas* of which *existential or spontaneous* is the first; the other two are *normative* (*communitas* as a resource-driven, permanent social system for the purposes of social control and meeting the goals of a given group) and *ideological* (found in utopian social models, such as those practised by religious communities). As I intimated in Chapter 1, normative forms of *communitas* most closely reflect the ritual-like formality of the scheduled meeting environment, albeit with a degree of flexibility in members’ ability to ‘opt out’ of attendance should schedules or ideologies conflict.

<sup>147</sup> It is however important to note that the contemporary leisure environment is a self-contained and bracketed sphere of activity that, unlike the socially transformative, integrative nature of community ritual that permeates the everyday life of its participants, instead provides an ‘escape’ or ‘excursion from the domain of paramount reality’ where one can gain authentic insights into other modes of being without the trappings and complexities of the social world in which it is immersed. (Cohen and Taylor, 1974:117-119 *cited in* Sharpe, 2005:2005:277; Fernandez, 1986:179)

To this effect, two techniques I observed being used in parallel were *demonstration*, and the use of *sight markers*. Demonstration involves volunteers acting as mediators between visitors and the experience they visitors have journeyed to ‘consume’; to this end, it requires two protocols: *authority*, and the *power to recreate experiences*. Authority stems from volunteers’ own expertise, of which tourists normally have little, and their ability to ‘direct the action’. As noted by Urry (1990:9) people have to learn how, when and where to ‘gaze’.<sup>148</sup> Informal discussions with other participants yielded the frequent response that they were “here to learn” and get “hands on experience.” To this end, volunteers must be careful how they guide interpretations and actions. Volunteers may provide suggestions for focusing the eyepiece when visitors are looking through the telescopes, but it is left to participants to manually focus on the object, to organise themselves into a line, to ask questions or to choose the object in the sky to be viewed. Promoting the idea that the



FIGURE 18. Townsend Observatory entrance, Christchurch. The sign by the lock (right) reads: “Public Sessions on fine Friday Evenings 8pm to 10pm”.

experience can be recreated by the participants at home in their own time - with the purchase of the appropriate commodities of course - is pivotal to maintaining the liminoid state; visitors must depart feeling they have gained something they can take back with them when they return to the ‘everyday’ (Sharpe, 1990:270). In addition to demonstration, volunteers make a point of highlighting extra-ordinary astronomical phenomena - nebulae, globular clusters, or areas of the sky where exo-planets have been recently discovered – that serve as *sight markers* (MacCannell, 1976:131)<sup>149</sup>. The more unusual the marker, the more ‘sacred’ its association was likely to be with the overall experience. One visitor remarked that she had never imagined she would be able to view the Andromeda Galaxy in any real detail, thinking it was “just for the big telescopes in orbit to take photos of”. Her suggestion that this “was something to remember”, in tandem with other aspects of that evening’s events (a motorised scope had broken down and necessitated an impromptu outdoor planetarium show as the local society’s engineering guru made quick repairs) provided something out of the ordinary and solidified the idea that everyone was engaged in something ‘genuine’. Bell and Lyall (2001:137) note that “each journey means more experiences to add to

<sup>148</sup> However, authority relations in a leisure setting can be problematic. While participants are willing to let those with experience assist in slowly peeling away the superficial layers of the staged back region (MacCannell, 1976), individuals engaged in leisure activities do so primarily to escape the routines of everyday life (Sharpe, 1990:270).

<sup>149</sup> MacCannell uses the term *sight markers* to denote the way tourists read and interpret symbols associated with the tourist experience. MacCannell notes for instance that the tourist who “[eats] cracked crab and garlic bread at Fisherman’s Wharf [in San Francisco]” may believe he is capturing the flavour of the city, and in turn partakes in a conventionalised ‘sight → marker → sight transformation’ which then becomes a symbolic marker for that individual’s sightseeing experience; one that may be referred to at a later date for the purposes of constructing narratives and stories (MacCannell, 1976:131). In the case of astronomy, the association of a marker (the ‘sky’ [nature]) and its referent (‘astronomy’ [science]) is created through a process of *sight transformation*. This transformation is the ‘end point’ of the tourist experience.

one's catalogue, and more resources for personal identity construction." In this sense, visitors' interaction with the 'sacred' is commodified as a story; the return from the journey being symbolic of one's ability to successfully engage with, and appropriate, facets of the experience to add to their collection of personal skills and knowledge.

While the emphasis on minimal structure, examples of exceptional phenomena and social enjoyment is advantageous for creating a liminoid experience, volunteers are also aware that such experiences skim precariously close to the margin where tourists' expectations of entertainment in such an environment supersede the more informative elements of the evening. On this note, Michael suggested:

I guess...what we try to do is really just show people what's up there...it's not about, you know, setting out to entertain people because we...don't have a large multimedia projector or a planetarium, it would be nice to have [those]...out here the *sky's* the planetarium you know...on a good night [*laughs*]...The education or, you could say it's almost like the instructions they're getting...[that's] the entertainment you know?...It's that cliché, you know, 'learning is fun'...[but] that's the truth of it, it should be enjoyable, just getting to see or learn something new you didn't know before, or didn't understand. You don't need anything else, you know, just have a bit of a chat with the person beside you...it's interesting enough on it's own.

In addition, volunteer 'Bill' stated that participants "come out and see the night sky and are just amazed by it. It's great to see their eyes open for a change...But it's just that side of it, that tourist side, it can create that 'wow' factor instead of a real genuine interest, which is the thing we're trying to achieve in many respects." It is this 'tourist side' that highlights the limitations of *communitas* as a means to encourage individual reflection in a liminoid space. Turner (1982) notes that liminoid conditions are different from *liminal* conditions; liminoid events tend to be transient and episodic, a form of adult 'play' consistent with contemporary leisure activities that allow for the temporary shedding of social roles, as opposed to the socially transformative elements found in traditional, community-focused ritual. While participants have the ability to tangibly or intangibly appropriate elements of their experience, these elements are only ever 'catalogued' and reproduced to others as narratives, rather than enduringly 'incorporated' into one's life; the latter a desired feature of the experience that echoes the Weberian concept of *lebensführung* discussed in Chapter 1. Bill emphasised this point in asserting that:

I mean...what we want to do is have people get interested in astronomy, but there's more to it than that...there are changes [that have occurred] that affect us humans...plant life and animals...You can't do you know, 'good' astronomy, good astronomical science in most places now, light pollution [being] the main problem...It affects us and them [visitors to the public night] and that's something worthy of discussion. It's not all stargazing and chatting [and] being wrapped up warm with a cup of cocoa in your hand...you have to see the bigger picture.

This recognition by volunteers that the tourist-educator framework, while useful, is imbued with a set of potentially detrimental concepts involving entertainment and consumption, necessitates that volunteers attempt to create associations that endure after the experience has ended.

In the sections to follow, I will discuss and elaborate upon some of the background concepts, attitudes and motivations involved in creating these associations, including how volunteers appeal to tourists existing middle-class appreciation of the 'sublime' landscape by renegotiating their attitudes to what they consider 'nature', and how volunteers endeavour to elevate the sky to a level of 'sacredness' through the use of mechanical and social reproduction (MacCannell, 1976). Most pivotal to the construction of these associations however is the increasing problem of light pollution, as it provides a digestible and familiar category against which more complex ideas can be contrasted and communicated to public night visitors. In the next segment, I will detail informants experiences with and responses to this problem, followed by an examination of how, by associating industrialisation and urban lighting with 'pollution', volunteers seek to illustrate how an issue detrimental to astronomical observing also obstructs the ability of tourists to engage with nature in ways previously unconsidered.

### Light Pollution

The subject of light pollution frequently ended up comprising a large portion of discussions with informants, most of whom offered multiple anecdotes concerning how it had affected them personally or local astronomical society activities.<sup>150</sup> Informant Steven stated that:

back...when I was a kid...the city was pretty much black you know, but now you stand up there and you see a string of factories going up, and there's one, the light is really bad, about two-thirds of the energy going up into the sky. It's just ignorance, mismanagement as far as handling the light goes...if people just shielded the lights, it would save a lot of problems...About 8 months ago, the city council put two streetlights, and they were that bright that I could stand outside my window and you could actually see my shadow on the wall behind me. And I took a photo of that to show them, there were these two big bulbs...Talking to certain guys, people who install the lights, even they say that the streetlights are a very poor design. When you look at this lamp here [*motions to a lamp on the table*] the design is good, the bulb is recessed up under the shade and the light goes down where it's supposed to be, whereas street lights, the bulb comes out and spreads it all out everywhere...If you go up the hill, you'll see the street lights from up there. That tells you something's wrong.

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<sup>150</sup> The issue is also a frequent topic on conversation on various amateur astronomy bulletin boards and internet forums. While a readily available source of in-depth information, the sheer volume of archived discussions is too much to include here. One discussion of note however concerned local Wellington astronomers critiquing the use of flood-lights used at the Westpac Stadium: "The Wellington Stadium people were arguing to the media that it was perfectly okay to hold an evening sporting event because as long as there were 30,000 people at the stadium, they would have left their lights off at home...What is not taken into account is with all these stadium lights being installed is...[h]ow many house-hold lights [worth] of power is being consumed?" McGavin, Mike (2006); excerpt from post to the *nzastronomers* Yahoo™ Group; June, 2006. Retrieved from: <http://tech.groups.yahoo.com/group/nzastronomers/message/5176>

The most frequent point of contention among informants however was how light pollution affected educational events for the general public. Steven relayed his frustration that: “You’ll want to point out something, a star and you’re trying to show someone but it’s like “oh drat, that lights in the way”, and then you talk about light pollution to them...I mean, we understand that streetlights are necessary for safety...it’s just the fact that the lights are going *upwards* instead of downwards. Stupid, you know?” These discussions also included frequent accounts involving international visitors, highlighting that New Zealand astronomers are not alone in dealing with the problem:

A friend...was telling me that back in 1986, when Halley’s Comet was around, some Asians, from Japan, they turned up at a public night, and they set up in the hills. And these kids, there was a big commotion going on, and all these kids screaming and yelling, and [my friend] went over and asked “what’s wrong” you know, ‘is everything ok?’ And the parents said “it’s the first time they’ve ever seen the stars”. I mean, *ever* seen them. And of course, with all the light pollution in Japan and stuff they’d never seen the stars before. [My friend] was conflicted I think, happy that they were seeing [the stars] but also...a bit depressed about it all! That things had gotten so bad there that this was so wonderful to them.<sup>151</sup>

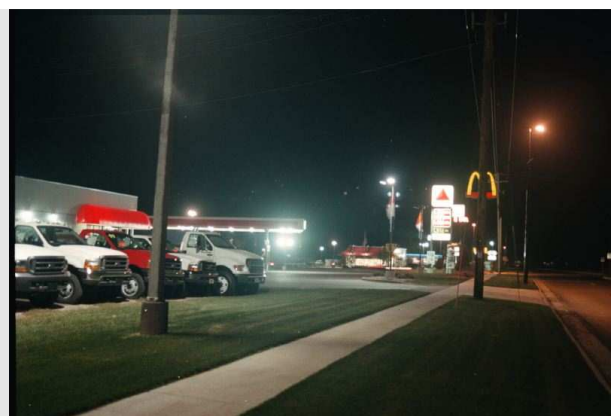


FIGURE 19. Light pollution from unshielded lighting on a city street, Gisborne, New Zealand.

In Alberta, Canada, one of the highest-ranking countries for street-light induced pollution, various projects were undertaken over a seven year period to mitigate the annoyance to local astronomers and urban residents. These projects included low wattage EnviroSmart bulbs, lamp shielding techniques and a light free reserve set aside for those wishing to escape the radiance emanating from Quebec and Montreal (Schaff, 2005; Greatrex, 2003). As one informant who had spent some time in Montreal observed, the local

council had saved upward of 2 million a year in electricity costs with the retrofitting of shielding to all sodium arc lights in the region, including a 16,000 tonne reduction in annual carbon-dioxide emissions. In the United Kingdom, research by the Council for the Protection of Rural England (CPRE) found that during the 1990’s, the amount of countryside with dark skies was reduced by 27 percent. In 2003, CPRE and the British Astronomical Association launched a campaign to fight the problem in conjunction with the International Dark-Sky Association (IDA). Surveys initiated in 2006 asked over 2000 residents in rural locations to count the number of stars they could view in the constellation of Orion. Of the 50 stars in Orion observable with the naked eye in total darkness, at least 54% of respondents stated they could

<sup>151</sup> Renshaw and Ihara (1997:107) in their study of Japanese astronomy, note a nationalistic ‘love of nature’ derived from a shared agrarian heritage and roots in ancient Shinto religion, clashes heavily with the continual ‘shaving’ of mountainsides for development and the encroachment of burgeoning cities onto dark-sky sites.

observe less than 10 from their backyard, with only 2% - those in the most remote areas - stating they could see 30 or less. CPRE used this as evidence of an increase in sky glow from poorly shielded street-lighting infiltrating the rural countryside, prompting authorities in some areas to revise existing plans in favour of fewer lights that utilised effective shielding techniques (Greatrex, 2003; BBC News Article; Lindsay, Anna; 18 November 2004).<sup>152</sup> While this emerging international response to light pollution was viewed as inherently positive by my informants, it was also infused with frustration toward local community and council attitudes to mitigating the issue:

Well, we've seen the council and things like that, but unfortunately around here, astronomy doesn't even rate as peanuts...they're *polite*, but from [the council's] perspective it's just "*tough*"...if it played rugby perhaps [*laughs*]...Taranaki [is] rugby mad...You'd think the economic argument would get through if nothing else. We say 'well, we can't see the stars', and [the council] say 'so what?'...When I was in Tucson [United States] in 1990, down at the street-level at night, you could hardly see anything [in the sky], but go up just *one* floor, with the covered lighting, and it makes all the difference...better control, better quality of lighting, a remarkable effect. Trying to tell them this here, they're like "oh no"...The fact that a quarter of the light is spilling straight upwards, they just don't want to know...I mean, you drive down the street in the afternoon and they've got the streetlights turned on to use up the power! Because they've paid for it in advance you see...It's just wastage...I can't understand the attitude, you know, more efficient lighting, more efficient shielding, surely [it's] going save you money! But they don't seem interested in doing that.

This economic rationale has its roots in a 2001 study commissioned by the Energy Efficiency Conservation Authority (EECA), that suggested that of the \$18.6 million (\$31 million including network costs) spent on street lighting annually, the New Zealand government could save upward of \$2 million through improved street lighting design (Greatrex, 2003). Despite a raft of support from astronomical societies however, these recommendations were never implemented. Informant Stan suggested the reason that the government chose to maintain the status quo was simply a case of competing economic motivations: "for one thing...the people involved in creating the light pollution, they're the engineers...they have an interest in people always using power. It maintains jobs [and] services...there's money floating around and well, [the economy] has to keep moving, bottom line...so, they don't really care how it's used or how it's wasted...Though, recently, we managed to get a 5 kilometre exclusion zone around the observatory out at West Melton [Christchurch]. We've been working with the Royal Astronomical Society Dark Skies Association to try and get things going there."

As a figurehead for light pollution activism in New Zealand, the Royal Astronomical Society of New Zealand (RASNZ) Dark Skies Association's primary function is making contributions to national Urban Design Protocols that promote sustainable development planning for regional, city and district councils. The Association's mission statement suggests that "RASNZ believes in the importance of the New

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<sup>152</sup> <http://britastro.org/baa/content/view/226/2/>; site last accessed 05 October 2007



Zealand night time environment in terms of the cultural, historic, educational, scientific and recreational importance of the stars, other night time phenomena, and the geographic uniqueness of New Zealand at night...wasteful outdoor lighting is reducing the intrinsic and amenity value of the night time environment for urban and rural New Zealanders.”<sup>153</sup> However, RASNZ admits it has “limited resources to instigate community engagement forums, but undertakes to contribute where possible.”<sup>154</sup> To this effect, the bulk of community efforts fall to astronomical societies and individuals, who can freely use the RASNZ Dark Skies ‘brand’ as an authoritative touch to planned events. A handful of the respondents I interviewed who considered themselves affiliates of the RASNZ Association<sup>155</sup> were directly involved in promoting some form of light pollution awareness, though interestingly, this was principally aimed at other astronomers - “to keep it...‘fresh in the mind’”, as one respondent suggested. Informant Carl, a passionate astrophotographer, admitted that gathering active support for an issue “not altogether that important for non-astronomers” was difficult, and so was eager to utilise the online community to gather empirical evidence that could be useful for some kind of future initiative: “Every month for the [*Yahoo NZ Astronomers* internet] group we should have a light-pollution category...you know, everybody sends in their photographs of light pollution for the month...that could really bring the issue into focus for people, and the next year, you can take another photo in the same spot, you know, to see if it’s gotten worse over the year...That’s just me doing my part you know, trying to do something that could be useful later on [if]...people were to organise [an event] at the local town hall or something.”

While garnering public support for astronomy-focused initiatives is difficult, circumstances occasionally arise that assist local astronomers to highlight the light pollution problem, framed as a part of larger issue. In early 2007, members of the local astronomical community in Wellington were quick to join with other scientists, “fisherman, lawyers, botanists, artists, teachers, landscape professionals, parents and children” in their protests against planned developments on Te Raekaihau point by the Wellington Marine Conservation Trust and the Wellington City Council. Two websites – *Save The Point* (STP) and GADOT, *Group Against Development On Te Rae Kai Hau* - were initiated to provide information and garner public support. The STP site stated that “Te Raekaihau Point is part of the outstanding natural beauty of Wellington’s South Coast. To erect a multi-storey building here would ruin this natural heritage feature that present and future generations are entitled to enjoy. Te Raekaihau Point has significant geological, ecological, scenic and landscape values...Because of these values it should be protected from development and managed as a scenic reserve which everybody has access to.”<sup>156</sup> The astronomy-centred GADOT website in particular made the association with astronomical science and environmentalism explicit<sup>157</sup>:

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<sup>153</sup> <http://www.rasnz.org.nz/darkskies/>; last accessed 5 February 2009

<sup>154</sup> <http://www.rasnz.org.nz/darkskies/astronomy.htm>; last accessed 5 February 2009

<sup>155</sup> I use the word “considered” as the RASNZ Dark Skies Association carries no official ledger or record of individual membership. Rather, affiliation is seen as ranging from ‘being sympathetic’ to being a fervent or active supporter of the Dark Skies efforts to increase awareness of the issue at a community level.

<sup>156</sup> <http://www.savethepoint.org.nz>; site last accessed 21 October 2007

<sup>157</sup> <http://www.gadot.wellington.net.nz/>; site last accessed 21 October 2007



Global warming is part of an astronomical process, and is a major component of any discussion about ecology, environmentalism, maintaining our social fabric, and protecting our natural resources from destruction by development. Te Rae Kai Hau Point is already used in thoughtful, loving, and scientific ways, and shared with the world, particularly its night characteristic, which is a quality of darkness that can be driven to very quickly when needed, and equipment setup to monitor and capture astronomical and atmospheric phenomena, such as aurora australis, comets, galaxies, and all faint visual objects.<sup>158</sup>

As appeals to local councils and the wider community in some parts of the country fall on deaf ears, attempts to engineer social transformation during educational public nights can be seen as a continuation of efforts on behalf of established activism; a form of “rural tourism...that stem[s] from the broader development of an environmental politics in the past two to three decades, and the resistance to widespread attempts to ‘modernise’ particular areas or localities” (Urry, 1990:99-100).<sup>159</sup>

### *Theatre of Stars*

*Among a myriad of silhouettes, Murray slowly navigates his way through the tightly packed row of seats toward the planetarium projector. Having just filed in from the seminar room down the hallway, the crowd – projectionist and resident astronomer Murray included – open their eyes wide and fumble about in the near-darkness, necks flexing and heads straining skyward as they settle in for this evening’s demonstration. In keeping with the planetarium’s ‘no cellphone, no white light’ policy, the dome overhead is bathed only in the pale reddish hue of the projector’s standby light.*

*As eyes adjust to the low light, you can catch glimpses of other faces in the milieu: the panoptic seating arrangement under the dome faces everybody inward, and a collection of stolen glances (in among some protracted, socially awkward stare-a-thons) take place as people attempt to stave off their restlessness. As a consummate professional however, Murray’s sixth sense is already at work:*

*“Now, if you’ll just bear with me...we’ll be along in a minute. Not long to go now...Just chat amongst yourselves for the meantime...I’ll be back in a tick.”*

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<sup>158</sup> Action against the proposed \$20 million marine education centre ended in late 2008 when the Wellington Marine Conservation Trust withdrew its High Court appeal against an Environment Court decision denying the Trust resource consent to proceed.

<sup>159</sup> A related perspective put forward by one informant suggested that light pollution indicated a growing social trend concerning the break-up of families: “Even though New Zealand’s population isn’t going through the roof...families are splitting, the father and mother split, and they each need a house...Being a teacher you see this, people are screaming out for housing, and every house needs lights, and you need another suburb...so then you need more streetlights so people feel safe, and then there’s advertising, and then there’s security lights...It’s a real problem.” Informant Andrew made a similar comment, noting that in his town “back in 1952, the population was about 27,000...it’s now about 50,000...now you’ve got more house lights, more streetlights...they’re on every street now...from where I used to observe, the amount of lighting has increased something like 35% since 1982. And that’s...lots of extended families they’re called now, people moving on from one another and creating new families.”

*Murray slips up the aisle - and with adjusted eyes, more speedily than when he came in – to fetch some unknown apparatus, a sliver of light from the hall outside creeping across the rear wall as he exits. No-one seems to notice. This evening's group – a hotchpotch of age and gender, but irrevocably from the knowledge-seeking middle-class – laugh and chatter with increasing volume as they engage in conversations ranging from the totally banal to the uncomfortably intimate. A young woman's voice on the other side of the projector remarks that things are taking too long; she wants to catch up with some friends later tonight - how long does this show run for? A cellphone screen lights up her face momentarily as she checks the time, provoking a muffled murmur of disapproval from the couple next to me.*

*“Oi! If you don't wanna be here then just leave! Far out woman!” The young male voice from our right is full of sneering contempt, almost jovial rather than outright aggressive, although the overall effect is the same. A few nervous laughs of approval emanate from the rows to our left as the young woman's cellphone is switched off and her vocal protestations over tonight's lack of adherence to schedule immediately cease. As if on cue, Murray suddenly breezes up the aisle beside us like a ghost, apologising profusely for the delay and carrying a box with a cord dragging on the floor behind him. Anticipation at a start to tonight's proceedings quells the audience's chatter enough that Murray is free to ask the inevitable question as he sets his box of unknown goodies on the floor and begins to hurriedly collimate the projection lens.*

*“So, has anyone been to a planetarium show before? Hmmm?”*

*The woman from the middle-aged couple seated next to me replies that yes, she's been to one in Melbourne, Australia, but it was geared toward school-aged children and not really what she had expected. Murray replies that tonight's show is a little more technical and reliant on one's own experience. There's a pause as Murray leaves room for further replies. The remainder of the group stay silent. No word from the young woman with her cellphone either. “Well,” Murray declares enthusiastically, “we don't have the fancy special effects here, there's nothing digital about this setup...this unit is a bit old fashioned so you will have to use your imagination. However, on we go...” Murray makes a final adjustment and suddenly a series of soft-toned lights flicker on around the base of the projection dome as a rather disappointing collection of white dots on a dark blue sky replaces the red hue of the standby light. As eyes squint and pupils contract, the puzzled look on the myriad of faces is immediately apparent: why go to the trouble of adjusting to the darkness then swath the room in low light? Is the display overhead really it for this evening?*

*Having already launched into his script, Murray is seemingly oblivious to the confusion around him, peeling off one-liners and detailed descriptions of astronomical phenomena with the efficiency and poise of a seasoned public speaker:*

*“Now over to the left here for those of you to the right, or upside-down as the case may be...hope that’s not too confusing for you...now can you all see where we are? Good, good...now here in the constellation Scorpius, just above Jupiter there, is the red giant star Alpha Scorpii, better known as Antares...now this star is 500 times the size of our home star Sol, and just to give you an idea of its size, if it happened to be in the same position as our Sun, it would extend right out to the asteroid belt, past the plane of the inner planets, our own Earth, and Mars...”*

*As Murray continues, he produces a laser pointer with which to trace out some of the common stars, planets and constellations visible in the southern night sky. The ocular shortcomings of this evenings presentation it seems have already been forgotten. People seem genuinely fascinated, and whisper quiet approval to each other as Murray continues his script, explaining the equatorial plane, planetary movements and what one can expect to see on a clear winter’s night.*

*Around 10 minutes have passed since the beginning of the presentation. Murray has covered the majority of the white specks above, and switching off his laser pointer, concludes his script by stating (in the form of a muted lament) that this is what one could expect to see on a clear night in any ‘standard town or city in New Zealand at this present time’ with the current level of street lighting. As the audience start shuffling papers and reaching for handbags in anticipation of a quick exit, Murray reaches around the projector and fumbles for a switch. The array of soft lights at the base of the dome start to fade, synchronised with the increasing brilliance of the multitude of dots appearing above the heads of the audience. The combined effect is mesmerising, and once the cycle completes the gasps from the audience indicate that Murray’s subtle point has not been understood.*

*With the planetarium in total darkness, the dome above is now resplendent with thousands upon thousands of stars – that actually look like stars in contrast to the unimpressive white dots of moments ago – complete with the Orion arm of the Milky Way slicing through the astronomical panorama like a cosmic flesh wound in space. The audience are murmuring to each other approvingly. One voice – perhaps the young man who had earlier chastised Ms. Cellphone – barks a half-shouted “Yeah!” from the outer seats, earning some distracted applause from those seated opposite. “Now,” Murray remarks, businesslike and unexcited, “this is what you could, although I tend to say should, be able to see of the night sky on any given clear evening, without the light pollution I mentioned a moment ago. Normally to see the sky as you should see it, and you can see everything up here on a good night, you’d have to be out in a decent rural area quite a few kilometres from the nearest artificial light source. Now, if you can follow me here...over here, if you follow this band of stars running along the edge of Centaurus to this point I’ll give you a bit of a story...”*

### Sacralising Sights

*There's no substitute for darkness.* What does this mean? It means if you have to choose between a huge scope that sits in your light polluted city back yard, and a small scope that you can carry out to remote, dark areas, go small and transportable. I can see more with my 2.7" scope under a really dark country sky than I could with my 10" scope in my suburban back yard.<sup>160</sup>

*"Guide to buying a telescope" (2002) Langwoods Photography, Timaru*

When asked how light pollution had affected them directly, responses from informants were customarily framed as distinctions between 'rural' and 'urban'. During an interview with an informant, he expressed his frustration that, regardless of the rural zoning of the subdivision in which he and his wife settled in 1998, over a ten year period "they've built more houses, and the school over the road, they put more lighting in, these big tall lights I call 'cobra heads' ...it used to be really dark out back here, and now...you see can see shadows cast, so it's gone downhill." Despite journeying to find suitable dark-sky sites, some informants found that many of the areas they had originally earmarked for night-time observing were slowly being 'invaded'. Steven, who had experienced this intrusion first-hand on a number of occasions, was visibly irritated at the prevalence of hobby-farms and urban lifestylers in his region, stating that:

You get 'forced out' into the countryside away from the suburbs you know...and what's annoying about *that* is that you get lifestyle-types who want to come out into the country, they want to bring all the comforts of the city with them you see, so suddenly you start to get all this street lighting being installed because they want it to be safe and secure, and they want to be able to see what they're doing out in a paddock in the middle of the night, which is quite ridiculous when you think about it...I mean, they expect all the city conveniences out there without all the inconvenience of rural living.

In chapter one, I mentioned that finding a suitable light pollution-free area involved a journey of approximately 10 to 15 kilometres out of the town centre to find a rural or semi-rural location. While this is a necessarily pragmatic requirement, I also suggested that observers have an affinity for total immersion in the rural environment; one that reflects the "intellectuals' taste for nature" (Bourdieu, 1984:220 *cited in* Urry, 1990:89) that practicals habitually frequent as a part of their contributive participation. In this respect, the 'solitary gaze' (Urry, 1990:13)<sup>161</sup> is constructed as distinct to a 'collective tourist gaze' associated with an urbanised working class engaged in forms of trivial, mass entertainment. By immersing oneself in the 'natural', the astronomer is thus elevated above the meaningless distractions indicative of urban life (Glacken, 1967:xiv; Kliskey and Kearsley, 1993; Friedman, 1994:182; Miller, 1994:93). When prompted to provide individual reflections on stargazing in the rural environment, volunteer David explained this as 'the equivalent of "having a one on one" with the cosmos':

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<sup>160</sup> [http://www.nztelescopes.co.nz/guide\\_to\\_buying\\_a\\_telescope.htm](http://www.nztelescopes.co.nz/guide_to_buying_a_telescope.htm); last checked 16 March 2009

<sup>161</sup> Though in the context of the informal observing group, 'solitary' may define a collective that subscribes to the same fundamental philosophy.

There's something pretty special about being out under the stars at night...when it's just you, politics and [the world] just kind of fade away...'awesomeness' is the word that probably describes it, something just so big about...just being alone with the [night sky]...If people can get that, some kind of feeling for it...[our job] would be a lot easier you know, people would just be like 'oh wow, this is amazing, I can do this'. I mean, it's science too, people don't realise that [science]...can allow you to tap into that side of yourself, that sense of just...'whoa, here I am'.

While on the one hand, this response reflects an enthusiastic appreciation of the dark-sky observing experience, its conflation with the effects on one's sense of self carries hallmarks of a contemporary romanticism that is itself associated with the touristic consciousness. The romantic movement, identified by Aitchison, MacLeod and Shaw (2000:52; also Luhmann, 1993) as beginning in the late eighteenth century, originated as a response by artists, writers and composers to existing social and political norms, that also included concerns regarding the scientific rationalisation of nature and the encroachment of industrialisation onto the rural landscape.<sup>162</sup>



FIGURE 20. The sublime New Zealand landscape: Ongarue Valley, Taumaranui.

Nationalistic representations of citizens absorbed by their natural surroundings, combined with a tendency to gaze upon and accentuate the 'sublime' (the "awe-inspiring and majestic aspects of the 'natural'") brought the viewer "into a personal, spiritual relationship with nature, and thus [an] unmediated connection with the Divine" (2000:53-54). Bell and Lyall (2001:179) argue that the New Zealand landscape in particular is strongly associated with sublimity, suggesting that "in choosing to endlessly replay sublime landscapes as sites of national achievement...New Zealand constructs sublimity as one of the dominant strands of national identity." MacCannell (1976:105; also Urry, 1990) suggests that this romantic gaze, like the solitary gaze exhibited by individual practicals and informal observing groups, characterises nature as "sacred", and thus ordinary, everyday urban life as "profane". For example, in an examination of Israeli trampers' attitudes to nature, Ben-David (1997) notes how visitors to the wilderness construct opposing categories of profane 'society' and sacred 'nature' in the context of the *tiyul* (hike):

[T]he category known as *nature* is made up of...behaviour[s] connected directly or indirectly to...an environment perceived as 'unchanged' by man and his technology...flora, fauna, and scenery. It

<sup>162</sup> Kliskey and Kearsley (1993:204-205) note that the rural wilderness is seen as "natural and unspoiled, wild, free and challenging, but [also] sacred, pure and exciting", a place where "the beauty of nature may be encountered, and where the routines of the civilised world are left behind". Likewise, "the countryside is thought to embody some or all of the following features: a lack of planning and regimentation, a vernacular quaint architecture, winding lanes...and the values of tradition and the lack of [human] social intervention..." (Urry, 1990:97).

includes a flexible approach to time; food that is uncooked and untreated, cleanliness, silence, and isolation from all mass media...The category known as *society*...is made up of those...systems of behaviour that are man-made...buildings, roads, factories, electricity...a more rigid time structure, cooked and processed food, dirt, noise, air pollution...” (1997:135, my emphasis)<sup>163</sup>

As nature is perceived to exist independently of man it is also perceived as intrinsically ‘divine’, in contrast to Calvinistic philosophies that portray mankind as ethically depraved and in need of moral control. In this sense, the man-made phenomenon of light pollution is framed as indicative of runaway industrialisation, an outcome of humanity negating its *moral* responsibilities to contemplate its effect on the natural environment. Douglas (1966) for example, suggests that in the absence of a clear directorial imperative, a pollution belief can provide a useful rule for determining ‘post-hoc’ whether an infraction has taken place: “When an action that is held to be morally wrong does not provoke moral indignation, belief in the harmful consequences of a pollution can have the effect of aggravating the seriousness of the offence, and so of marshalling public opinion on the side of the right...When moral indignation is not reinforced by practical sanctions, pollution beliefs can provide a deterrent to wrong-doers” (1966:133). I suggested in chapter one that demonstrative and performative actions can contain a morally regulative element, and although volunteers stop short of directly moralising to visitors on the issue of light pollution when conducting interactive public nights - preferring instead to utilise an existing tourist framework in which to present ideas - the methodology is nonetheless similar; ideas communicated through action and symbolism, imbued with a set of negotiated meanings derived from associations with scientific knowledge.

Discourse on the effects of modernity and modernisation on social structure (Giddens, 1990; Giddens, Lash and Ulrich, 1994; Friedman, 1994; Kuentzel, 2000) suggests that inhabitants of metropolitan cities perpetually seek ‘ontological security’ (Giddens, 1990) as an antidote to the dynamicism and ambiguity involved in modern living. As the majority of tourists come from urban areas, they “[seek] out rural landscapes as an important element of the tourist experience...as it embodies a constant force in times of rapid change” (Aitchison, MacLeod and Shaw, 2000:101). However, this idolisation of nature is also somewhat problematic, in that the touristic category of nature is predominantly symbolised (and photographically represented) through ‘scenery’, a fact noted by both professional and amateur astronomers involved in anti-light pollution initiatives:

For sky viewing, Mt John is the best place in New Zealand...if we lose the night sky here then that’s it...Most people living in cities have lost contact with the night sky, they simply don’t see what’s up

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<sup>163</sup> Although it should be noted that in New Zealand, there are several exceptions to this. First, ‘nature’ appears to be more specifically defined than in Israel. ‘Nature’ must be *real*, authentic, and therefore “native” to New Zealand. This tends to be defined in nationalistic terms rather than locally. A plant originally from the South Island growing on Kapiti Island is still “native” due to nationalistic boundary definitions. In contrast however, pine trees - despite being part of the New Zealand landscape for decades - had their genetic predecessors introduced from a different, non-New Zealand location by humans. Accordingly, the existence of a pine represents landscape that has been contaminated by humans (although later generations of New Zealanders may be unaware of the fact and treat them as purely ‘native’; likewise, many timber yards sell “NZ Native” radiata pine, an illustration of re-categorisation for the purposes of commerce - that is also tied to contemporary manufacturing efforts to promote the appearance of sustainability and eco-friendly production methods.

there...and when they see the sky...they're simply blown away by the sight of it...That's the point I try to make at public meetings...people talk about preserving the *scenery* at Lake Tekapo, that kind of thing...everyone's so worried about what's down *here* and not paying attention to what's going on up *there*...

- Graham Murray

*Our Changing World*; Radio New Zealand, Thursday, 2<sup>nd</sup> August 2007 9-10pm)



FIGURE 21. Townsend Observatory, central Christchurch.

In this respect, the principal aim of volunteers is to 'shift the focus upward'. By petitioning an existing touristic consciousness that reveres the sublimity of the natural landscape, astronomers hope to broaden the category of the 'sacred' to encompass the scenery of the night sky. In this case, volunteers make use of what MacCannell (1976) refers to as the process of *sight sacralisation*. This process comprises five stages: *naming*, in which a sight is deemed to be "worthy of preservation"<sup>164</sup>; *elevation* and *framing*, in which sights are labelled as 'sacred' or 'authentic' and the space between viewer and sight is landscaped or 'framed'<sup>165</sup>; *enshrinement*, whereupon the material used to 'frame' the sight itself becomes sacred or authentic<sup>166</sup>; *mechanical reproduction*, in which the sight is reproduced in prints and photographs<sup>167</sup>; and finally, *social reproduction*, in which "an associative element is created between the object and everyday language and action" (1976:44-45). It is this final

stage that exemplifies the goals of public night volunteers attempting to create enduring associations after the viewing experience has concluded.

The parallels between MacCannell's schema and the public night experience can be best explained as a series of narrative techniques employed by volunteers in the course of the demonstrative and 'sight marking' facets of the evening as discussed earlier. The *naming* process is convenient in that it already exists: astronomers, astrophysicists and planetary geologists make observations, record data and ascribe names to astronomical phenomena, both scientific (New General Catalogue (NGC))<sup>168</sup> classifications such

<sup>164</sup> "[A] sight is marked off from similar objects as worthy of preservation...or it may be arrived at inductively by empirical observation...reports are filed testifying to the objects aesthetic, historical, monetary, recreational and social value." (MacCannell, 1976:44)

<sup>165</sup> "Elevation is the putting on display of an object – placement in a case...or opened up for visitation." *Framing* is the placement of an official boundary around the object which may involve either *protection* – such as paintings behind glass – or *enhancement*, such as extra guards around a sacred object. "[F]raming occurs when the rest of the world is forced back from the object and the space in between is landscaped." (MacCannell, 1976:44, 45)

<sup>166</sup> "When the framing material that is used has itself entered the first stage of sacralisation [and has itself become] an 'authentic' marker [of the object it contains or has come to represent]" (MacCannell, 1976:45)

<sup>167</sup> "[T]he creation of prints, photographs, models or effigies of the object [are] themselves valued and displayed...[this is the phase] most responsible for setting the tourist in motion on his journey to find the true object" (MacCannell, 1976:45).

<sup>168</sup> The New General Catalogue method of classification was established in 1888. Prior to 1888, deep-sky objects were commonly referenced via the Messier system of classification (Charles Messier, *Nebulae and Star Clusters*, 1774), though both are still in frequent use today.

as *NGC1952*) and colloquial (“The Crab Nebula”). And as the default starting point for any educational endeavour (one must ‘know what to look for’ before it can be found), significant names, labels or designations are the first pieces of information inculcated to the assembled group. The lens and eyepiece of the telescope literally frames the night sky, and all the named phenomena contained therein, for the observer. The observatory itself - in which the telescopes mediating the observers interaction with planets, stars and galaxies is housed - consequently becomes a site of *enshrinement*. There is an added advantage in that numerous New Zealand observatories, and the equipment they house, have been singled out for preservation due to their heritage value, assisted by financial contributions from the local council or bequests from members of the local community. Many were constructed in the early part of the twentieth century: for example, the Gifford Observatory of Wellington, built in 1924; the Townsend Observatory of Christchurch, erected in 1896, which houses the 6-Inch Townsend Refractor Telescope made in 1864 by Cooke and Sons of York and London, or the James Cook Observatory in Gisborne, housed

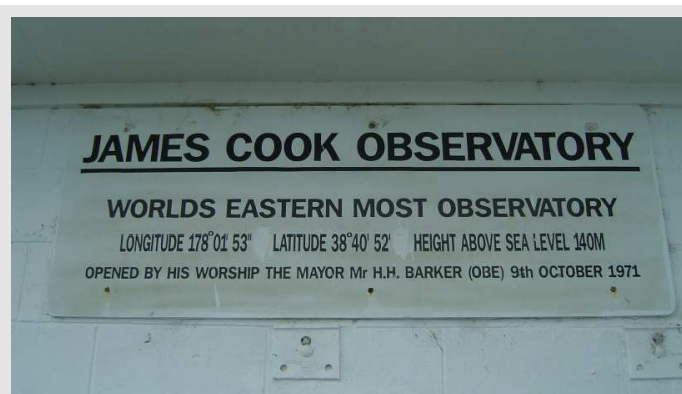


FIGURE 22. *James Cook Observatory, Gisborne*. The observatory was built from an existing concrete bunker located behind a WW II gun emplacement by the Gisborne Astronomical Society, and was officially opened in 1971. The observatory received a new 10” telescope in 1989 which is still in use on public nights.

upon what was originally an observation post and anti-submarine gun emplacement used by the New Zealand home-guard during World War II. Likewise, the Phoenix Observatory of Carterton houses the British-assembled 6” F18 refractor originally owned by Peter Read, New Zealand’s own version of Carl Sagan, who presented a monthly television segment throughout the 1960’s and 1970’s called *The Night Sky*. Questions from the public regarding the origin, construction and human involvement with these scientific relics were a predictable fixture at all of the public nights I attended, and volunteers - many of whom had resided in the area for most of their life - were able to provide a detailed history of the artefact in question. One volunteer, who confessed to having a particular adoration for vintage machinery (as well as a regular subscription to *Popular Mechanics*) commented:

Well, a [tele]scope is, in many ways...it’s just a large magnifying glass, a lens with mirrors...but it’s the most important tool for astronomers, the most portable. Some of the ones we use [on public nights] are very old [but] they’re beautifully simple, really well constructed...there are definitely some [astronomers] who consider anything too computerised, the go-to scopes, well to them you know, “that’s just cheating”, but they’re in the minority...I mean, they all have computers at home! They wouldn’t get very far without them...The feat of engineering involved in making the original [sky] tracking [devices (that assist the telescope to follow a star or object)], that historical side, quite ingenious...I mean it’s ‘pre-motorised’ [sic], no worm gears...just inertia, gravity...very intricate mechanics...you know, quite amazing really.



César Graña (1971:98 cited in MacCannell, 1976:82) in his work *Modernity and its Discontents* notes that: “the destruction of local traditions and the assault upon “the past” perpetuated by industrialisation and world-wide modernisation seem to make large numbers of people susceptible to an appetite for relics of pre-industrial life.” While these particular ocular relics are not ‘pre-industrial’ in the literal sense, they do however appeal to a nostalgic, nationalistic belief in ‘pioneering New Zealand scientists’ on the verge of new discoveries, as the country renegotiated its identity and began gradually disassociating from its British roots (Bell and Lyall, 2001). In this respect, functional, technical artefacts that would ordinarily be considered indicative of progressive modernisation are conflated with ‘the past’.

The fact that the symbolic meaning of commodities can be re-negotiated when necessary is pivotal to the sacralisation process in more than one respect. MacCannell (1976:127) notes that while “the conservation-conscious epoch in which we live tends to define all...sight obliterations as a kind of blight”, tourists, as they endeavour to seek out an unobstructed view of an authentic sight, have an almost unique tendency to re-obstruct it in the process - a situation triggered by a propensity to congregate *en masse* around a specific site, or the importation of external influences (car lights, flashlights and cell phones were all particular bugbears of my informants) that signify a desire to maintain certain levels of everyday comfort and mobility whilst participating in their authentic experience. For instance, public night volunteer Richard noted that despite the semi-rural location of his society’s observatory, “there’s a streetlight right down there in the car park, and it’s a damn nuisance, aimed straight at the observatory...When we have public nights, we can if want to, scale a ladder, and if we can find the key, we can actually turn it *off*. But then we get people moaning and grizzling that they can’t see where to park their cars...[car lights and flash] lights go on all over the place...you can’t win!” Although some observatories had resorted to putting up signs warning visitors to turn off headlights and phones, Richard noted that in the case of his observatory, people often ignored the signs because “you simply can’t *tell* people what to do [because]...they’re worried about safety, tripping over in the dark or scraping their knee...But they don’t get [that] for one thing, the human eye, it can take 20 minutes or more [to adjust so] you can observe properly...And all these lights flooding in, the little torches they have on the [mobile] phones too...are half the bloody problem...we’re trying to teach and [in this place] lighting is something we really don’t need.” In this respect, fostering “a time and place of withdrawal from normal modes of social action” (Turner, 1969:166-167) can be seen as a strategic technique to disconnect visitors from the material commodities that facilitate daily life. The motivating factor for instigating this act of renegotiation is simply that light pollution harms astronomy and therefore, harms the process of scientific inquiry. As the role of scientists is to engage with nature, light pollution prevents the accumulation of knowledge; which, as discussed in chapter one, is fundamental to the act of contributive participation and the information sharing that results from amateur-professional collaboration. If the night sky is congruent with existing conceptions of nature, it thus becomes ‘sacred’, and part of a category defined in opposition to urban life and the technologies that instigate the rapid (and thus ‘immoral’ man-made) changes in the social, political and economic facets of metropolitan societies. The key goal of volunteers in this respect is disassociating ‘technology’ as a category endemic to urban life and

redefining it in such a way that it becomes congruent with nature in a functional sense. To this effect, as a part of demonstrative and ‘sight marking’ facets of evening, the computerised telescopes, laser pointers and tracking devices are incorporated into the experience and highlighted as facilitating visitors’ interaction with a facet of nature - the literal ‘past’, in the form of photons that have travelled light-years to the eyepiece - that they would ordinarily be unable to gaze upon. The enshrinement of the observatory entails that its inner workings are sufficiently imbued with a sense of history in their own right, having a ‘defined period and style which symbolises a collective inheritance of the natural environment’ (Aitchison, MacLeod and Shaw, 2000:101). In this respect, history, technology and nature are presented to tourists as synonymous.

In addition, telescopes serve as a tool for capturing features of the natural world that the human eye cannot process. The images, models, videos and other multimedia derived from data collected by the orbiting Spitzer and Hubble Telescopes and ground-based observatories *mechanically reproduce* astronomical phenomena. These visual representations of star clusters, nebulae and distant galaxies eventually find their way onto various consumer items: books, posters, postcards, backpacks or coffee mugs. While on the one hand these images serve as a means to propagate the achievements of various space agencies in the eyes of the general public, they also serve as the primary influence that motivates visitors to seek out the stargazing experience. Public night volunteer Michael explained that: “[the public], well they see these pictures on the TV, and they think that’s what *we’re* looking at, but of course what you’re really looking at is the light from the star, at a

great distance, it mostly comes to us in shades of grey...and people, well they get sometimes get a bit disappointed by that...People are really interested due to some of the pictures they see from Hubble, the amount of detail in those images...that’s what attracts a lot of them here in the first place.” Michael’s claim echoes Sontag’s (1979:109 cited in Urry, 1990:139-140) argument that what is really sought by tourists is a set of images or representations that are ‘hunted down’, visually captured and then displayed to others as versions of the images they had originally seen before venturing out. Despite the reality of astronomical objects observed with the aided human eye falling short of their mechanical reproductions, the “ideal representations” (Urry, 1990:86) of these objects are so powerful that tourists will still depart the experience with the image firmly entrenched; an ‘illustration by proxy’ that serves as a symbol of their personal engagement with the object or site.<sup>169</sup> For example, at the conclusion of one night’s viewing a



FIGURE 23. Interior of the New Plymouth Observatory showing posters and photographs; Marsland Hill, New Plymouth.

<sup>169</sup> Likewise, observatories may have souvenirs, books, posters or information sheets available enabling visitors to “take the experience home with them.” (Sharpe, 2005)

visitor commented to me “I saw that!”, pointing to a richly detailed false-colour image of the Large Magellanic Cloud; this, despite the fact that what we had all seen through the telescope that evening was a dense collection of bright dots immersed in a field of grey.

Social reproduction, in which “an associative element is created between the object and everyday language and action” (MacCannell, 1976:44-45) incorporates the preceding aspects of framing, enshrinement and mechanical reproduction, and represents the final phase in the process of sacralisation.<sup>170</sup> By elevating and

framing celestial objects through a lens, the night sky is landscaped as an aesthetic and sublime representation of nature; the ocular equipment that allows participants to gaze upon this sublimity, and the structures in which they are housed, by default become objects of enshrinement, and the mechanical reproduction of astronomical phenomena maintains a perpetual visual reference of the knowledge gained through the advancement of astronomical science.



FIGURE 24. *Mechanical Reproduction goes postal*: the Southern Skies stamp series issued by New Zealand Post in June 2007.

Social reproduction entails that above all, people must depart ‘transformed’. The quest of the tourist to find something authentic has been likened to a ‘pilgrimage’ by Urry (1990:8), in which visitors to a site, event or structure exit the experience ‘transformed’ by it. Because the liminoid space is constructed in opposition to everyday life, pilgrimage liberates the individual from obligatory, everyday constraints

of status and role and defines the pilgrim as an integral human being with the capacity for free choice (Turner, 1969:166-167; 1974: 201)<sup>171</sup>. This is important insofar as contemporary tourism and leisure practices, outlined earlier in this chapter as bracketed and temporary forms of experience, carry little of the transformative weight that societal and communal forms of ritual convey. Turner (1978:15) notes however that pilgrimage in the context of tourism is a transformation of the *moral* self, rather than a transformation resulting in social standing; a reciprocal action taking place within social relations that involves persuasive and educational, rather than coercive, forms of social control based on changing the identity of the regulated (Ruonavaara, 1997:289, 290). On this note, volunteer and informant Michael surmised the situation in the following way:

<sup>170</sup> The most obvious example of social reproduction in a literary form is science fiction, though some minor linguistic examples - ‘space cadets’, for the socially detached, or people complaining of ‘astronomical’ prices - are also in common usage.

<sup>171</sup> Turner’s work on ritual follows Van Gennep’s concept of *rites de passage*, in which the self passes through different stages of structure – separation from the familiar spatial residence and social group; the liminal or marginal period, which is characterised by structurelessness; and the reincorporation into the familiar spatial residence and social group, as a renewed self. The spatial structure of the pilgrimage and other liminoid structures is movement of the self from familiar place to ‘far’ place, and back to ‘familiar’ place.

[United States astronomer] Carl Sagan, he had this passage in the beginning of [his]...book *Contact*, it wasn't in the film, it was short but really summed it up well I think...just how people, you know, all the changes that had happened over the past few hundred years, going from being farming folk to living in cities with all the light pollution, how it had led to people losing the night sky [and] the only way to really see the stars anymore was to actually go *into* space and see them...I mean quite simple really, but just well phrased...It's something I'd like to read out [during public nights] you know, but the tone of it can be a bit preachy, I've seen people's reactions to things like that...even I don't like being preached to, so, you have to...just [try and] you know, 'educate', and that's it. People will make up their own minds, but...as long as they have the *right* information, you know...and then they're properly informed...you hope they see things differently.

Some informants, such as David, phrased the public night experience in less specific terms, opting for an understated philosophy that emphasised the importance of the general public's understanding of astronomical research:

I think...basically, I'd just like for people to have some real understanding of what [astronomers] do, and in that way to be ...at least *sympathetic* to astronomy, to the science of it. There's things people can do...that benefit other people being able to see what's up there...Education...well it's more than education...it's *learning*, which is different to education [because] you don't *have* to listen to someone who is teaching you, but [learning] is just so important for understanding how things work and why its important to know how things work.

## Conclusion

MacCannell (1976:102) suggests that tourists are motivated to seek out authentic experiences, especially un-staged "back regions" or social spaces that permit them to gaze upon insiders immersed in another kind of reality. The observing experience – simply 'viewing', as if through a window, or gazing at a landscape – is familiar, yet remarkably novel. In this respect, MacCannell suggests that what is being sought by tourists is an 'inversion of the everyday' (1976:123). This concept finds an affinity in Turner's (1982) suggestion that leisure spaces are analogous to the 'anti-structures' of tribal societies. While the liminal attributes of tribal space are highly ritualised, the specialised liminoid space of the modern leisure setting allows individuals to "stand outside the ordinary flow of collective values, axioms and conventions and [thus] objectify the order of everyday life" (Rojek, 2000:148-149; Fernandez, 1986:178-179). By utilising this space, volunteers aspire to promote an "irrefragable genuineness of mutuality" or *communitas*, an anti-structural response to the hierarchical relations of the structured everyday world (Turner, 1969:137; Fernandez, 1986:178-179).

Rojek (2000:149) suggests that Turner's work is significant in that it demonstrates how leisure settings can be conducive to forms of transformative power. Rather than simply reproducing collective life (Durkheim, 1915; Stebbins, 1979, 1992), it has the potential to challenge and overturn categories of normal identity,

association and practice. While liminoid spaces do not contribute to transformations in social standing, Urry (1990:8) proposes that the tourist's quest to find something authentic is reminiscent of a 'pilgrimage', in which their experiences with a site, event or structure 'transforms' and liberates them from the constraints of status and role. Subsequently, the pilgrim is defined as an integral human being with the capacity for free choice, imbued with the potential for a transformation of the *moral* self, that endures beyond the initial experience (Turner, 1969:166-167; 1974: 201; 1978:15). There is a definitive link in this suggestion of moral transformation to the Weberian concept of *lebensführung*, or 'conduct of life' discussed in Chapter 1. However, while 'practicals' employ differentiation, collaboration and demonstrative ability as morally regulative devices to promote scientific contribution among their peers, their interaction with 'cosmic tourists' is engineered in such a way that differentiation and hierarchy acquiesce to a liminoid space in which individual reflection and the ability to exercise personal choice is encouraged.

While useful as a method for advancing educational goals through an authentic, shared learning experience, volunteers are nonetheless conscious of the transient nature of the liminoid space and the potential for the experience to be mentally bracketed as an episodic form of consumer entertainment. In recognition of this potential, volunteers take advantage of an established postmodern touristic consciousness that perceives nature "as outside historical time and beyond the boundaries of our own cultural

experience" (MacCannell, 1976:77) in order to construct enduring associations between astronomy and nature. Landscapes, plants, trees and the air through which light from the outer universe reaches the telescope are categorically defined in opposition to urbanisation and the ersatz trappings of modern life. 'Light pollution', a subset of a category associated with dirt and disease and toxic to astronomical research, is presented as synonymous with the encroachment of industrialisation onto the unspoilt landscape. To this end, visitors feel they are partaking of a genuine, authentic encounter with the natural world, which allows astronomers to instil "a sense of place and (in)significance" in the cosmos (Sharpe, 2005; Greatrex, 2003).

Likewise, observatories and telescopes, especially older relics symbolic of a time when science was on the threshold of new discoveries, have a "defined period and style which symbolises a collective inheritance of the natural environment" (Aitchison, MacLeod and Shaw, 2000:101), exploiting a touristic tendency to conflate nature with the past. As noted by MacCannell (1976:83), "the restored remnants of dead traditions are essential components of modern consciousness...the tourists' quest is not limited to a search for traditional elements restored and embedded in the modern world; they also search for natural and

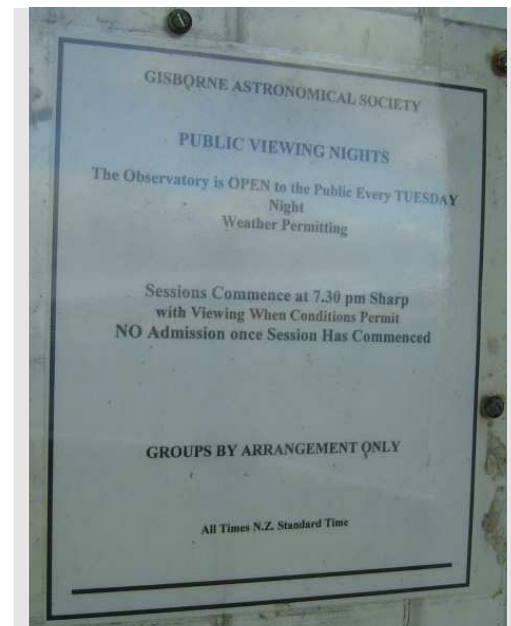


FIGURE 25. Notice containing information on public viewing nights displayed outside the James Cook Observatory, Gisborne.

contemporary social attractions in the same matrix. When tradition [and] nature...are transformed into tourist attractions, they join with the modern social attractions in a new...universal solidarity, that includes the tourist.” More so, the presence of technical equipment that allows visitors to ‘gaze’ (Urry, 1990) upon



FIGURE 26. Interior of the New Plymouth Observatory, Marsland Hill, New Plymouth.

nature cultivates an affirmative association between scientific advancement, technology, humanity, and the natural environment. As suggested by Moss (2007): “When we have people at the eyepiece...we have a unique opportunity to remind people that we are all here on this one small planet, we need to take care of it and of each other. The amateur astronomy community is somewhat unique in that we have embraced technology and the internet has united us.”<sup>172</sup> The observing experience is thus constructed as a ‘deep reality’ in which volunteers can cultivate a

germ for future social developments and societal change by presenting astronomy and science as intrinsically ‘in-step’ with nature (Sharpe, 2005:277).

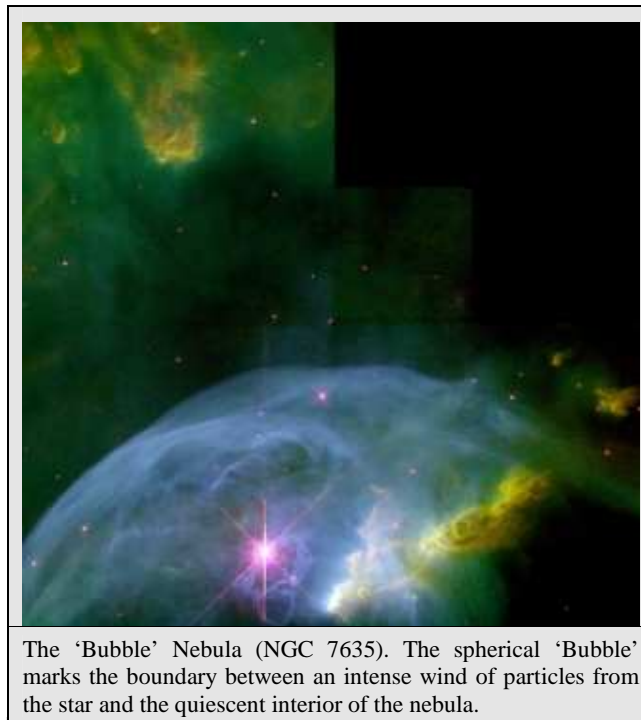
A key theme examined in both chapters so far has been the issue of *knowledge* and its relationship to individual action: specifically, how information is accumulated, the importance it holds for those doing the accumulating, and the manner in which it is disseminated to others. In the final chapter, I will further expand on this theme in examining how astronomy may be framed in other ways, and the implications involved in creating associations between scientific knowledge, nature and astronomy that deviate from the established regulative framework instigated by members of the New Zealand astronomical community.

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<sup>172</sup> Moss, Paul (2007): excerpt from statement on GADOT website; <http://www.gadot.wellington.net.nz/sky/index.html>



## Chapter 3



### *Fake Stone, Real Wilderness*

Image credit: NASA; *Public Domain image*  
GRIN Database Number: GPN-2000-000876  
Image # : PR00-04  
<http://grin.hq.nasa.gov/index.html>

### Fake Stone, Real Wilderness

We suppose ourselves to possess unqualified scientific knowledge of a thing, as opposed to knowing it in the accidental way in which the sophist knows, when we think that we know the cause on which the fact depends, as the cause of that fact and of no other, and, further, that the fact could not be other than it is. Now that scientific knowing is something of this sort is evident - witness both those who falsely claim it and those who actually possess it, since the former merely imagine themselves to be, while the latter are also actually, in the condition described. Consequently the proper object of unqualified scientific knowledge is something which cannot be other than it is.

- Aristotle, *Posterior Analytics* (Book 1 Part 2)

ג וַיִּמְצְאוּ הָעֵץ, אֲשֶׁר בְּתֹךְ-הַגֶּן--אֹמֶר אֱלֹהִים לֹא תֹאכְלוּ מִמֶּנּוּ, וְלֹא תִגְעוּ בוֹ: פֶּן-תָּמּוּתוּן.

'but you must not eat from the tree of the knowledge of good and evil, for when you eat of it you will surely die.'

- Genesis 2:16-18

As mentioned at the conclusion of the previous instalment, the theme of knowledge and its relationship to action has been an underlying feature present in both chapters discussed to this point. In this chapter, I seek to make this theme much more explicit, in discussing how certain fundamental (and traditional) arguments on the subject of 'genuine knowledge' conflict with emergent ideas and philosophies of 'knowing'. The Oxford Concise Dictionary<sup>173</sup> provides three definitions of knowledge (though a variety of others exist); as an "awareness or familiarity gained by experience (of a person, fact, or thing)", a "theoretical or practical understanding of a subject, language, etc. [*sic*]" or a "true, justified belief; certain understandings, as opposed to opinion." All three of these definitions are correct in their respective contexts; "with experience comes wisdom" is a common maxim relevant to the first. Technical expertise in a discipline, especially that which requires constant study and demonstrations of proficiency, is a hallmark of the second definition. The *third* definition however - a "true, justified belief" as a basis for knowing or understanding - is the proverbial 'thorn in the side' of many scientific rationalists. This approach to knowledge, derived from philosophical examinations of epistemology, holds that one's understanding of the world - be it natural, synthetic, material, or ethereal - is rooted solely (to a reasonable degree) in individual perception and intuition; a set of phenomenological accounts of existence that, in lieu of experience or expertise, constitutes a form of knowledge that is both valid and useful. And it is on the periphery of this particular topic that the following discussion takes place.

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<sup>173</sup> *The Concise Oxford Dictionary of Current English* (1995), Oxford University Press, New York, United States of America



As a part of my fieldwork, I had made several visits to a small rural farmlet in the Wairarapa, one of which involved taking part in a guided tour of a man-made structure dubbed “Stonehenge Aotearoa”. This visit was, at the time, part of a different agenda concerning the functioning of astronomical societies in New Zealand, the use of resources and (however dull and pragmatic) taking stock of the average number of members likely to show at any one meeting. The experience was however, much like the visitor-tourists of chapter two, somewhat transformative. The myriad of additional features accompanying the site - a gift shop, a nearby observatory, a lecture hall with photographs of Druids caught mid-chant - suggested that this blend of science, tourism and ‘spiritual theatre’ was a repackaging of educational astronomy that was quite different from the futurist aesthetics of venues such as Auckland’s Stardome, or, as I was to examine later, the ‘hands on’ demonstrative science of local astronomical societies. As a result, I sought to broach the subject of the ‘Henge’ with future interviewees and attempt to understand where the site was perceived to fit within the wider New Zealand astronomical community.

The results of these inquiries, many of which I have reproduced verbatim in the discussion to follow, were sufficiently interesting for me to dedicate an entire instalment to fleshing out some of the more theoretical concepts that constitute the structures and frameworks in which astronomers and their fellow society members operate. Beginning with a background history and description of Stonehenge Aotearoa’s various activities, this chapter examines the role of the site as a catalyst in forming informants’ responses to debates regarding astronomy and education, culminating in a broader discussion concerning attitudes and theories of truth and empirical knowledge in relation to postmodernity and science.

### Stonehenge Aotearoa

There's a great deal that we've lost in our...*modern* society, some fundamental understandings of our environment, what's going on around us, the seasons. We know...that we can look at a watch and tell the time...you've got a calendar and you know its spring...but...to be able to come to a place like this and [use] an ancient calculator...it's like magic, it gives you sense of...‘oneness’ and an alignment within yourself with what's going on around you with the universe above and the earth below...You tie right into the reality of your environment...it's really a wonderful experience.

- Jennifer Picking, Phoenix Astronomical Society

*E=MC2: The Story of the Universe*

‘Stonehenge Aotearoa’ (promotional video segment, 2006)

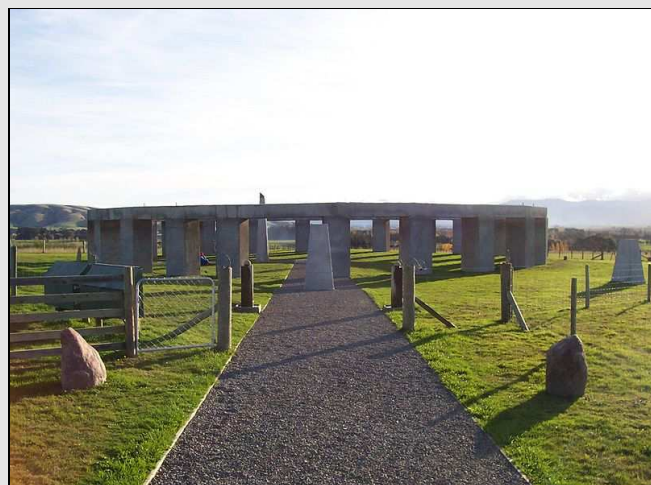


FIGURE 27. Entrance pathway to Stonehenge Aotearoa, showing heel stones and obelisk (Carterton, Wairarapa).

Stonehenge Aotearoa was designed and built as a practical open-sky observatory, taking inspiration from the famous 4000 year old Stonehenge monument on the Salisbury Plains of England. The structure, completed in 2004 and opened as a tourist site in February 2005, was constructed from carbon-fibre concrete<sup>174</sup> by Phoenix Astronomical Society president and project manager Richard Hall, members of the Phoenix Astronomical Society<sup>175</sup> and other voluntary labour over a period of 18 months, with \$56,500 worth of financial assistance provided by the New Zealand government's

Science and Technology Promotion Fund<sup>176</sup>. Measuring around 30 metres in diameter, the circular structure comprises 24 lintel-topped pillars encircling a five meter tall obelisk that casts shadows over a tiled analemma<sup>177</sup>, and six 'heel stones' used to mark the dates of celestial events such as solstices and equinoxes.<sup>178</sup> 'The henge', as it is commonly abbreviated, is located along Ahiaruhe Rd, a few kilometres east of the township of Carterton<sup>179</sup> in the Wairarapa region of New Zealand's North Island<sup>180</sup>, and was designed specifically for this geographic location based on its proximity to the star movements in the southern hemisphere. According to the Stonehenge Aotearoa website and related Phoenix Astronomical Society publications, the aim in creating the henge was to provide the general public with "a practical teaching tool to demonstrate how ancient people [Egyptian, Babylonian, Celtic, Polynesian and Māori] got

<sup>174</sup> Hall notes in a NZ Herald article that "We built the Henge in prefabricated carbon-fibre concrete, but initially toyed with the idea of real stone, thinking that every student in the Wairarapa could put one stone in place. It would, however, have added \$10 million to the cost." (Richard Hall, quoted in NZ Herald, Sunday Nov 09, 2008; 'Wairarapa: Power of the circle', Paul Rush, author)

<sup>175</sup> Phoenix Society members involved in the Stonehenge Aotearoa project were unanimous in their support and admiration of Hall's achievements, and all those with whom I conversed informally or interviewed on the topic of the 'Henge' were characteristically full of praise and enthusiasm. Society member and informant Gareth relayed to me that: "I've been into astronomy for years, and Richard Hall is the person I really look up to...he's a brilliant speaker...he really captures your attention, puts really good PowerPoint [presentations] together...his talks are really amazing. From astronomers to the general public, he's been to so many events. The Stonehenge in the Wairarapa...I remember being out there six years ago, and [at the time] there was just a little observatory, and he said to me "I'd love to have a Stonehenge out here", you know, some clubrooms, some bunkrooms, facilities, toilets, all these things for people to come out and learn, a lecture theatre set up, [a] shop's just gone up recently, and over the last six years I've seen him do all that, and it's just amazing. ...He was on the front page of the Dominion Post to do with the Equinox Solstice, and he was even on [TV3's] *Campbell Live*...that's brilliant."

<sup>176</sup> This funding was administered by the Royal Society of New Zealand.

<sup>177</sup> A path in the shape of a figure-8 that marks the sun's movement across the sky throughout the year, the 'infinity' shape reflecting the Earth's elliptical orbit and axial tilt.

<sup>178</sup> Graham Palmer, Personal Website: [http://www.skyhigh-photography.com/Main/Stonehenge\\_Aotearoa.php](http://www.skyhigh-photography.com/Main/Stonehenge_Aotearoa.php); last accessed 14 October 2008.

<sup>179</sup> Royal Society of New Zealand Website, 7 February 2005, <http://www.rsnz.org/news/releases/stonehenge.php>; last accessed 15 September 2008

<sup>180</sup> Stonehenge Aotearoa Website, <http://www.astronomynz.org.nz/stonehenge/stonehenge.htm>; last accessed 19 October 2008

practical information on the seasons...It is used to teach *maramataka* (the calendars of time and seasons)...The stones also form a Polynesian star compass and can be used to teach navigation.”<sup>181</sup>

A tour of Stonehenge Aotearoa takes approximately two hours. The first 40 minutes is spent in a theatre, where Richard Hall provides an introductory seminar and a graphic-intensive audio-visual presentation on Britain’s Salisbury Plains, outlining the historical significance of the stone circles and their functional use as a celestial clock for planning subsistence crops and as a star-guide for seafaring. The remaining hour of the experience, a guided tour of the fibreglass Henge itself, consists of Hall explaining the stones, the obelisk and the analemma in the context of Māori and Polynesian myth<sup>182</sup>, culminating in a demonstration of the structure’s natural acoustic reverberation produced by the ritual chanting of Druidic worshippers during equinox celebrations.

It is this last part of the Stonehenge Aotearoa tour that highlight two aspects of the site that make it particularly unique as an astronomy-related tourist venue. First, there is an explicit focus on heritage and the *past* as opposed to the futurist, scientifically progressive angle espoused by its astronomical contemporaries. For instance, Lake Tekapo’s *Earth and Sky* frames its activities around the observatory’s role as a national research facility, inviting



FIGURE 28. The original Stonehenge, Salisbury Plains, England.

potential visitors to “tour the southern sky with a knowledgeable guide and view the stars and planets through a selection of modern telescopes...Visit an operational observatory and discover how the universe is explored.”<sup>183</sup> Likewise, Auckland city’s *Stardome* boasts a “blend of education and entertainment to share our passion with close to 60,000 New Zealanders [annually]...Our facilities include an amazing 360° digital dome theatre, and the 0.5m Zeiss telescope.”<sup>184</sup> Secondly, Stonehenge Aotearoa serves as a host venue for a variety of specialised interest groups and events. Some of these occasions - a visit by

<sup>181</sup> Stonehenge Aotearoa Website, <http://www.astronomynz.org.nz/stonehenge/stonehenge.htm>; last accessed 19 October 2008

<sup>182</sup> Stonehenge Aotearoa is not the only astro-tourist site to utilise a New Zealand-centric approach to augment the tourist experience. For instance, The *Kaikoura Night Skies* website (<http://www.kaikouranightsky.co.nz/tour.html>, last accessed October 2008) makes a point of noting that Kaikoura “has a strong Maori History” that the tour guide may draw on to “take you on a journey from Horizon to Horizon through the night sky using...Maori and other indigenous Knowledge.” Likewise, the Dargaville-based *Astronomy Adventures* (<http://homepages.igrin.co.nz/astronomy/observing2007.html>, last accessed October 2008) website makes the indigenous angle explicit, utilising the naming conventions of Maori folklore: “Starting with Matariki we board the Canoe of Tainiu, Te ra’ o Tainui and sail through Taurus, Orion and into the heart of the rising Southern Milky Way...The anchor - Te Punga - of Tamarereti steers us South on our nautical voyage.. Look into the shark’s mouth - towards the centre of our Galaxy Find treasures galore with the fish hook of Maui (Scorpius) baiting Te Mangoroa, the long White Shark - the centre of the Milky Way.”

<sup>183</sup> From the Earth and Sky website (abbreviated); <http://www.tekapotourism.co.nz/activities/earthandsky.htm>; last accessed 15 November 2008.

<sup>184</sup> From the *Stardome* information website at <http://www.stardome.org.nz>. Last accessed 15 November 2008.

international friendship advocates the “World Harmony Runners”<sup>185</sup>, or a demonstration by professional Morris Dancers on January 1<sup>st</sup> 2008 - are simple entertainment provided by groups passing through on their way to other venues. Other events, such as *TiroTiro Whetu* (in conjunction with Papawai Marae), the July celebration of Matariki<sup>186</sup> and the Māori New Year (Te Tau Hou) represent an ever-expanding focus on incorporating Māori celebrations at a national level. On the 11<sup>th</sup> of March 2009, Gong Master Don Conreaux led a Full Moon Gong Bath at Stonehenge Aotearoa with the aim of submersing participants in the “healing power of the gongs resonance...and spreading the message of world peace”.<sup>187</sup> The most unique series of events however involve members of the Druid community. Like its hewn-stone counterpart on the Salisbury Plains in England, Stonehenge Aotearoa welcomes members of Wiccan, Druid and other neo-pagan groups to participate in a number of seasonal festivals, including *Alban Arthan*, a Celtic and Druidic sunset ritual at the Winter Solstice (late June); *Yule*, the Celtic and Anglo-Saxon Festival of the Winter Solstice (held at sunrise, late June), *Alban Elfed*, a Celtic and Druidic celebration of the Autumn Equinox (held at sunset, late March); and *Ostara*, a Wiccan dawn ceremony celebrating the Spring Equinox, held in September.

While the sight of men and woman dressed in robes, chanting archaic European dirges and wielding the *objets d'art* of a bygone era may seem at odds with astronomy and science, there is a decisive logic to Stonehenge Aotearoa's inclusion of the Druid community. When the 2008 edition of the New Zealand Lonely Planet Guidebook<sup>188</sup> was released, it described Stonehenge Aotearoa as ‘weird’ and ‘tacky’<sup>189</sup>, suggesting that the ersatz stone pillars immersed in rural farmland were quite unlikely to be the ‘highlight

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<sup>185</sup> <http://www.worldharmonyrun.org/>

<sup>186</sup> The Māori name for the cluster of stars known as the Pleiades, in the constellation Taurus. Among pre-colonial Maori, Matariki was a time to farewell the dead, acknowledge the past year's activities, greet the new-born and focus on the years to come. Crops were planted to placate *Rongo*, *Uenuku* and *Whiro*, the land gods, and the star cluster was ‘read’ to determine the conditions for future planting. If the stars were clear then the year to follow would be warm and productive. If hazy, the year would be cold and difficult. Further north, the rising of the star Rigel (Puanaga) instead marked the beginning of the new year, and a similar festival marked the event. (Best, 1922:25; information also taken from <http://www.matarikifestival.org.nz/history.asp> and <http://www.taitokerau.co.nz/matariki.htm>; last accessed 15 January 2009) As an informant explained the difference to me: “In Taranaki they look at Rigel or Puanaga which is the Maori name for it, and if you go down to other parts, further south maybe, certain tribes only celebrate Puanaga and not Matariki, because they're down in a valley and can't actually see [the Pleiades]...The Matariki thing [is] national in the sense that most people can actually see it advertised...[laughs] Te Papa is trying to turn it into a ‘harvest festival’, which is funny because, it's *not* a harvest festival, the harvest has already been done by then you know...it's about celebrating the shortest year, and a time for planning, planning for upcoming crop planting, and for planning times for revenge on your rivals and things.”

<sup>187</sup> Gong Master Conreaux's personal website ([www.holistic-resonance.com](http://www.holistic-resonance.com)) outlines his philosophy of the gong in which he states: “The gong is known as an instrument of transformational power. It is a tool by which we are engulfed in total sound, and through our intuition, we are brought back to optimum health and balance...Through gonging...We are no longer limited to a 3rd dimensional material world, but are taken to a fourth dimensional dreambody. When we are in a 4th dimensional dream body, there is less interference between our ego consciousness and our more evolved innate intelligence. Our innate intelligence is the consciousness, creating perpetual DNA-repair while we are alive. Although this repair goes on while we are in the awake state (beta consciousness), it is when our rational mind is asleep that the DNA-repair is better able to achieve maximum efficiency. This process begins in the alpha-theta state and reaches ultimate efficiency in the deep delta state. In delta-sleep, the mind is completely unconscious. In the completely meditative state of being awake while completely asleep (the 4th dimensional gong experience), we increase the re-youthing potential of the innate intelligence without going into unconsciousness. The personal ego is then able to attain a state of non-judgement or neutrality. This is the state of total body/mind harmony.”

<sup>188</sup> Lonely Planet, “New Zealand”; 14th Edition; August/September 2008

<sup>189</sup> The 2008 edition also described Auckland's Skytower as being as attractive as ‘a giant hypodermic needle’.

of your trip to New Zealand'.<sup>190</sup> While this may seem an austere criticism, this focus on the physical



FIGURE 29. Tourists, onlookers, and members of Britain's neo-pagan community engaging in an 'Earth healing' celebration at Stonehenge, Salisbury Plains, 1984. *Image Credit: Salix alba*

characteristics of the site is consistent with contemporary tourist attitudes toward 'authentic' landmarks and experiences. As noted in Chapter 2, Urry (1990:8) and MacCannell (1976:101) suggest that tourists search for authentic experiences outside of the normal sphere of everyday life, time and space. What is sought is an idealised image or representation of a 'real' place that is hunted down, visually captured and presented to others; both as a personalised version of the image they had seen before they ventured out, and as a part of a structured narrative that

reaffirms the narrator's identity and legitimates their journey (MacCannell, 1976:131; Urry, 1990:140). However, Stonehenge Aotearoa is itself a *representation* of a representation, and as such, is somewhat philosophically frustrating to the postmodern touristic consciousness; one that has become accustomed to redefining and fetishising 'authentic' realities into cultural products and experiences available for consumption by the target audience of the Lonely Planet guidebook series (MacCannell, 1976:91, Stokowski, 1994:23).<sup>191</sup>

As if surreptitiously pre-empting criticism of the Lonely Planet variety, Stonehenge Aotearoa has, since its inception, followed the example set by its Wiltshire counterpart and has embraced an 'alternative' community who by virtue of their sartorial fashion, beliefs and social networks, bring a sense of theatre and spectacle - but most importantly, authenticity - to the site. Although members of the British Druid community<sup>192</sup> have long been congregating and performing rituals on the Salisbury Plains, their presence

<sup>190</sup> As a result of these comments a minor furore erupted in the New Zealand Press, with Stonehenge Aotearoa founder Richard Hall and affiliate Mary Varnham responding that "Lonely Planet seems to think that Stonehenge Aotearoa is an imitation of Stonehenge in Britain, but this is completely wrong...I've been to both it and the original Stonehenge in Britain and there's no contest: Stonehenge Aotearoa is by far the most interesting experience." (Source: *Stonehenge Aotearoa hits back at 'tacky' label*; NZPA; Tuesday, 19 August 2008; URL: <http://stuff.co.nz/4661795a11.html>; last accessed 16 November 2008)

<sup>191</sup> I would also suggest that for the postmodern tourist there is an uncomfortable dichotomy present in having a manufactured structure, created by (or at least, *assisted*) by industrial processes - a facsimile of a naturally occurring material substance - standing in the midst of a rural landscape. Landscapes, especially picturesque ones, are seen as natural and 'sublime'; removed from the profanity and speed of modern life and as such, are perceived as being 'authentic' (Bell and Lyall, 2001:179; Aitchison, MacLeod and Shaw, 2000:101; Kliskey and Kearsley, 1993:204-205). Were the Stonehenge structure built in an urban setting, perhaps as the centrepiece of a town square or city, there would arguably be no problem. However, situated as it is in the 'pure' realm of the sublime landscape, it is seen to some as a dichotomous perversion - a combination of the profane modern with the idyllic past - and therefore unpalatable to the type of authenticity contemporary tourists seek to experience when travelling to engage with the object of their ideal representation.

<sup>192</sup> The Pagan federation was founded in Britain in 1970 as a 'focus for contact between the Craft of the Wise (also referred to as 'The Old Religion of Wisecraft') and those who might find rapport with the Old Ways' (*The Wiccan*, May 1990:1). They soon founded a strong association with the British 'hippy' community who had adopted the Salisbury Plains site

has only in recent years been commercially appropriated and transformed into a part of the Stonehenge experience by the English Heritage foundation<sup>193</sup>, wary of public assessments of Stonehenge as an archaic monument of negligible interest to the common tourist. The emphasis on Stonehenge has instead transmuted into a projection of 'living history', one that utilises spectacle and taps into the contemporary cultural fascination for nostalgia. Solstice events and rituals are heavily advertised, posters and postcards show chanting Druidical worshippers dressed in exotic robes, partially silhouetted against a sunset framed by the stone pillars (Aitchison, MacLeod and Shaw, 2000:103). It is in following this example that Stonehenge Aotearoa has eschewed the text-book driven, historically contextualised summary of archaeo-astronomy offered by other local astro-tourism ventures and formed a mutually beneficial relationship with a bevy of neopagan practitioners of mysticism and archaic ritual - one that allows tourists and spectators to momentarily disregard the dichotomy of the fake-stone-in-the-real-rural-landscape, and focus on the ritual theatre unfolding in front of them.<sup>194</sup> To this effect, a newspaper article in the local *Wairarapa Times-Age* (23<sup>rd</sup> June, 2008) reflected the view of spectators attending one of the Druidic Winter Solstice events:

Beginning at 4.30pm, druids led participants into the stone arena, to gather in concentric circles, to watch the sun go down, and to breathe, chant, shout and join in druidic prayers. The ceremony invoked the elements of air and fire, the directions of north, south, east and west, the plants oak and mistletoe, and featured small flaming torches to signify the return of light after darkness. The Maori deities of Rangi the sky and Papa the earth were also given mention, along with the heavens, the earth and the sea, sacred breaths and a sun-child soon to be born (Ford, 2008).

A statement on the Stonehenge Aotearoa website plays up this attraction in stating that "the structure serves as a window into the past" which welcomes "people of all cultures, beliefs, faiths and religions"<sup>195</sup>; a sentiment echoed by the Henge's parent group, the Phoenix Astronomical Society, via the inclusion of

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believing that 'psychic forces align themselves at this particular point' (Aitchison, MacLeod and Shaw, 2000:103; Luhrmann, 1993:221).

<sup>193</sup> When administration of the site passed from government agencies to the subsidiary organisation 'English Heritage' in 1984, administrators sought to find an even balance between tourism and the 'religious freedom' demanded by modern-day Druids and Earth worshippers. Previous groups congregating at the site for celebrating the solstice had also attracted a myriad of spectators, who in an attempt to get a better view had irreparably damaged many of the more brittle stone structures dotted around the main circle. When authorities closed the site to the public and fenced it off from outsiders, numerous clashes took place in the 1970's between police and those who demanded the right to visit the site and practice their chosen religious rituals. The furor dissipated in the 1980's with English Heritage's decision to create a 'tourist experience' for visitors, utilising the annual celebrations to draw crowds, charge them entry fees and encourage the purchase of Stonehenge merchandise (Witcombe, 2008; Luhrmann, 1993; Aitchison, MacLeod and Shaw, 2000).

<sup>194</sup> The Druid community's relationship with Stonehenge Aotearoa was also a focal point for discussion during many meetings of the Phoenix Astronomical Society. The following sample from my fieldwork notes suggests that the desire to create a strong association between the two groups was explicit: "President of the British Druids Society has come to New Zealand to conduct ceremony for Autumn Equinox in New Zealand. Other guests at the ceremony are Wicca's, hippies etc. Local mayor attending [and] Governor General. The event is the sunset at a certain point in the structure (10<sup>th</sup> Lunar Month). Hall spoke about future plans, plenty of photos, PowerPoint presentation. Photos of the previous Summer Equinox with the head Druid of Britain, some video footage of the congregation chanting. Angle very explicit with regards to educating the public regarding cultural value and history; ethos: diversity, celebrating culture, environmentalism."

<sup>195</sup> Stonehenge Aotearoa Website, <http://www.astronomynz.org.nz/stonehenge/stonehenge.htm>; last accessed 19 October 2008

the welcoming address by the Chosen Chief of the Order of Bards, Ovates and Druids in its April 2007<sup>196</sup> newsletter:

“Originally, thousands of years ago the Druids were the sages and spiritual leaders of people who lived in the far west of Europe: counties whose names today are Ireland, Wales, Scotland, England and Brittany. Today, Druidism transcends ethnic and national boundaries to appeal to people all over the world who are looking for a spirituality that reveres the earth and honours the turning of the seasons. It is an approach that some people feel to be a religion, but others feel to be more of a philosophy, which they may well combine with another path, so that Christian, Wiccan and Buddhist Druids can all come together to celebrate the fact that we are all One Humanity on One Earth.”

This hints at an additional link to a facet of the tourist experience that the Henge site possesses by virtue of geography. In Chapter 2, I noted that volunteers organising public viewing nights appealed to tourists' perceptions of the ‘natural’, making use of their rural location and observations concerning light pollution to create associations between astronomy and nature. Given Stonehenge Aotearoa’s status as a tourist site-cum-teaching tool, I would suggest that the site’s use of neo-pagan spectacle appeals to the same contemporary tourist consciousness. However, the tone of these associations differ significantly. The public-night volunteers discussed in Chapter 2 frame light pollution as an unfortunate by-product of industrialisation; a consequence of modern life and rational progress. Yet, this negative corollary is highlighted as one that has the potential to be re-negotiated or transformed into something ‘better’ through science - a point reiterated by the use of hi-tech telescopes and equipment in a rural setting that provides a confirmatory link between technology and nature. The divergence in approach between the two camps can best be explained as a difference in attitudes to what constitutes a suitable contemporary social order. As a philosophy of knowledge, science is rational, futurist and inherently progressive. Its adherents acknowledge the maladaptive consequences of progress in our modern existence, but recognise that these consequences are the results of a methodology that may also be utilised for purposes beneficial to humanity. ‘Modern life’ is not the problem; rather, the issue is how we choose to implement the knowledge revealed through our scientific interrogation of the environment (Law and Lodge, 1984; Lynch and Bogen, 1997; Hutcheon, 1997). Alternatively, the neo-pagan community frame humanity’s separation from nature as indicative of a larger social issue caused by rapid industrial progress and mankind’s technology-assisted subjugation of his environment. To this end, they seek to “save religious concepts by re-cloaking them in nature”, advocating a nostalgic return to a past where solutions to the predicaments of modern life are found in a society governed by higher natural laws (Turner, 1990:7-8; Luhrmann, 1993). The strictures of organised religion and a monotheistic deity are jettisoned in favour of “an ancient divinity immanent in the [natural] world”, that borrows from heavily romanticised interpretations of Celtic mythology, British shamanism and the Norse-Anglo-Saxon mythos of “Wyrd the ‘Goddess’” (Luhrmann, 1993:220). Aitchison, MacLeod and Shaw (2000) note that adherents of this new spirituality are predominantly middle-class, middle-aged and book-oriented, encompassing everyone from ‘weekend

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<sup>196</sup> Newsletter of the Phoenix Astronomical Society, No. 99, April 2007



witches' to spiritually frustrated Green Party sympathisers seeking "ancient traditions and the powers of the forbidden, the mysterious and beyond." While on the one hand, these groups engage in an innocuous "playful spirituality" (Luhrmann, 1993:220), the worship of nature as a divine entity carries with it an ideological rhetoric associated with a progressively conservation-conscious epoch; protection of "The Environment" from the consequences of industrialisation and modern living. Unsurprisingly, England's Stonehenge solstice festivals and rituals conjure up information stands dedicated to ecological activism, calls for donations to Greenpeace and participation in 'Earth healing rituals' that enable neo-pagans to act out political goals as a part of their religious experience (Luhrmann, 1993:222).

Despite the protestations of the Lonely Planet guidebook series, Stonehenge Aotearoa has found an interesting means of teaching historical science and astronomy by allowing the site to become what Bender (1993a:276; *cited in* Aitchison, MacLeod and Shaw, 2000:103) calls a postmodern "multi-vocal and dynamic landscape", one that presents itself as open to ideological negotiation under the auspices of an authentic tourist experience. The price of this authenticity however, requires that they maintain an ongoing relationship with a group that figuratively represent the antithesis of the modernist scientific ethos: the non-partisan, rational, progressive and empirical pursuit of knowledge. In doing so, they create an interesting dichotomy within the New Zealand astronomical community.

Among the many searching questions asked of informants during my research, "how do you perceive the role of Stonehenge Aotearoa in promoting astronomy to the general public?" was one to which I had initially attached a lesser importance. My (quite erroneous) assumption was that the site, given its media profile, its generous support from volunteers and the quantity of visitors passing through every year, was ostensibly well-received and respected among the New Zealand astronomical community. However, it became apparent that a large number of respondents had a different perspective on what constituted a suitable educational experience. While only a handful of responses to my question on the 'Henge' yielded explicit criticism of the site itself (and, as these criticisms stemmed from existing personality conflicts with specific individuals, I elected to bracket them as too subjective to be useful in this discussion), the majority of replies took the form of more general observations about attitudes to science and knowledge. For instance, the statement:

[well]...people are rather sceptical of scientists...there seems to be a certain disrespect for science...You do worry because...you want [the public] to at least have an understanding and appreciation of science and facts about how the universe works. Most people [today] believe what they want to believe because it suits them...



followed directly in the wake of a discussion concerning Stonehenge Aotearoa's hosting of the Summer Solstice, and how various media outlets frequently provided a short summary below the main story pointing out the site's (and the site's administrators') role as a science-based teacher of astronomy. While responses were, I surmised, being intentionally shifted toward broad concepts to avoid the uncomfortable task of directly expressing a personal viewpoint (even in an unstructured, anonymous interview, ingrained



FIGURE 30. External view of Stonehenge Aotearoa (Carterton).

social behaviours such as 'being polite' still very much apply), I would also suggest that informants framed their responses in terms that sought to maintain the image of a homogeneous community directed toward a common understanding. This reaction is understandable if recalling that the distinction between active observers and armchair astronomers discussed in chapter one is also embedded within a larger category that distinguishes 'insiders', the astronomical community,

from 'outsiders', comprising 'the general public'. I also proposed that practical astronomers distinguish themselves from armchair astronomers by engaging in demonstrative behaviours - active observations in groups, collaborative projects and performative-based reaffirmations of identity - that accentuate their own contributions to science.

Following from this, a key theme involved in this differential was the role of practicals as "critical observer[s] of the consumption habits of others" (Löfgren, 1994:55), in which armchair astronomers are conflated with those who surrender to "habitual work and leisure relations" that "conform to the requirements of a merely mundane existence" (Rojek, 1985:65). It is this 'ethic of the mean' (Weber, 1978:385-86 cited in Rojek, 1985:65) that is seen as symptomatic of urbanisation, commercialism and mass entertainment; an environment that perpetuates the 'increasing contradiction and ambiguity' of modern life (Friedman, 1994:182; Miller, 1994:93). However, as the Stonehenge Aotearoa site is a not-for-profit, volunteer-driven project,<sup>197</sup> it becomes categorically problematic for those who could otherwise dismiss the blend of science, history and metaphysical spiritualism as the hallmark of a revenue-gathering commercial tourist venture. In addition, the Phoenix Astronomical Society who run the site are a group comprised of active practical observers, many of whom regularly produce and contribute valuable knowledge to the wider community. The 'Henge' itself sits mere metres away from the society's functional

<sup>197</sup> As the Stonehenge Aotearoa site trades as a subsidiary of the Phoenix Astronomical Society (Inc.), under the rules governing the Incorporated Societies Act (1908) it cannot make a profit.

research observatories: the Phoenix Observatory, which houses an astrograph<sup>198</sup> and a variety of telescopes, including an 8" Meade Schmidt-Cassegrain and a 23" Dobsonian reflector; the Nankivell Observatory, and the Matariki Research Observatory which contains its own electronic guidance system and computers for data processing.<sup>199</sup> As such, it falls into a somewhat uncomfortable niche between the entertainment-focused commercialism inherent to professional tourist sites (for instance, Auckland's Stardome, or the soon to be re-opened Carter Observatory in Wellington), and the volunteer-driven, science-focused education of astronomical society public nights. It is this 'uncomfortable niche' – the occupation of a 'space between categories' – that I propose is the major source of ideological antagonism within some members of New Zealand's astronomical community. By blending science and a postmodern metaphysicality that embraces the relativism of knowledge, the site, whether intentionally or not, violates the code of contributive ethics that is morally regulated by the group to which they belong. To this effect, the discussion that follows addresses some of the chief concerns outlined by my informants, framed, as they themselves responded, in a wider debate concerning the attitude of scientific rationalists to knowledge, postmodernism and ideas of social order.

### Nature. Society. Control.

The crux of this issue concerns the manner in which scientists make a distinction between *society* and *nature*. Under the modernist premise<sup>200</sup>, scientific theories constitute the use of technical artefacts to investigate nature and a "disinterested search for truth" that, by virtue of their factual disposition, cannot be negotiated or politically imposed (Hutcheon, 1997). Sociological considerations, the importation of outside social interests and the subjective bias of politics or passion are seen, like invasive urban lighting or the mass consumption of entertainment, as pollutants of authentic science to be vigorously guarded against (Kaposy, 2002:34- 36; Law and Lodge, 1984:135; Shapin, 1995:297). The underpinning of this distinction lies in how the descriptive claims made by science are seen as inherently *objective* (descriptive), whilst *moral* claims, characterised by the school of thought known as postmodernism, are subjective<sup>201</sup> (Kaposy, 2002:37). Contemporary meta-ethics makes a clear distinction between moral

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<sup>198</sup> A telescope designed for the solitary purpose of astrophotography.

<sup>199</sup> <http://www.astronomynz.org.nz/history/history.html>; last accessed 15 March 2009

<sup>200</sup> *Modernity* is often characterised by a multitude of overlapping factors: industrialisation, capitalism and the dynamics of class society (Karl Marx and Adam Smith); scientific knowledge and technology (Henri Saint-Simon and Auguste Comte); disenchantment and bureaucratic, psychological and cultural rationalisation (Weber); egalitarianism and democracy (Alexis de Tocqueville); a conception of the autonomous 'individual' and the division of labour (Durkheim). Some by-products of these factors include secularisation; social mobility; literacy; citizenship rights; the differentiation of various social units, such as household and economy, from each other; urbanisation; and the separation of family from wider kinship groups. For some, these simply provide a backdrop to more general characteristics such as disruptive change and ambiguity. Spencer (1996:378) for example suggests that "at its most general, 'modernity' may serve as a broad synonym for capitalism, or industrialisation, or whatever institutional and ideological features are held to mark off the modern West from other, traditional societies."

<sup>201</sup> These distinctions appeal to what is known in philosophy as "thick concepts". Thick ethical concepts are descriptive-normative hybrids. They have empirically observable aspects and a normative aspect. For instance, concepts like "good" and "bad" are 'thin' ethical concepts. Concepts such as "dishonest", "cruel", "kind-hearted" and "vain" are *thick* concepts. Someone being dishonest or honest is something that is empirically observable; distinguishing the good from the bad is not.

claims on one side, and factual claims on the other. Normative statements cannot be derived from factual ones. Statements expressing a moral judgement are said to be expressions of emotion, not objects of cognition, or candidates for truth or falsity. Statements of fact on the other hand, can be cognised because they are subjects of empirical investigation, and they are candidates for truth or falsity. Moral normative claims - of the type derived from cultural values, political and environmentalism activism, commercial interests and other partisan agendas - stand firmly on the *Society* side of the modern scientific settlement, while descriptive claims - the empirical results of observing flora, fauna, ecological systems, stars, and planets - stand with *Nature* (Kaposy, 2002:37). The practical application of this distinction was noted by an informant, Malcolm, who regularly gave lectures in astrophysics at his local astronomical society:

Well, science deals with facts and you have to make informed decisions, and if people aren't scientifically literate, they're not making informed decisions. For example...[politics is about opinions and] global warming, that's a matter of scientific fact, *not* opinion, and people need to understand the difference between politics and science. It's things that are measurable, and observable and can be analysed. I've seen it before...that 'global warming is just some big conspiracy', and with the Y2K bug, people were [*mock voice*] "oh it was just some big conspiracy" [*laughs*]...But there *was* genuine concern, and genuine errors in the code. I can talk from experience, I had some photography software and it wasn't coded for the year 2000, and it just stopped working! So, I had to get a new version and updated and it worked just fine. When it comes to hype you tend to get the vocal minority rather than the silent majority.

However, proponents of a scientific world view have been accused by postmodernists of idolising science, belonging to an elite society seeking to maintain a monopoly on specialised knowledge which is no different in its essence from the truth claims of new-age mysticism (Hutcheon, 1997). Postmodernist discourse, originating in architecture and art criticism via philosophy and literary studies, advocates the demise of the great programme of scientific rationality and promotes relativistic knowledge, maintaining a scepticism of any 'truth-statements' produced by scientific inquiry<sup>202</sup> and any foundational (meta)narrative that provides a framework for discerning meaning (Turner, 1990:7). Michel Foucault (1966, 1974, 1980) for instance argued that what constitutes 'truth' grows out of the interests of the powerful and supports systems of repression. What we see as 'truth' entirely depends on the community in which we participate, and each community has its own 'truth' that permits its members to speak a common language and establish a commonly accepted reality (Devine, 2004:2-4).<sup>203</sup> As an example, in 1820's Scotland, the

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Dishonesty can be inferred by observing someone contradict themselves, whereas attributes such as "badness" are not as equally open to interpretation (Kaposy, 2002:37).

<sup>202</sup> A key argument utilised in postmodernist appraisals of scientific knowledge is that empirically-derived 'truth statements' are social constructions, the specificity of which involves the discovery and accumulation of a potentially utilitarian knowledge of, and the capacity to manipulate, nature. In this respect, the science of astronomy - the knowledge produced inside centres that gather photographs, spectra, radio signals, and infrared pictures - is not classed as objective knowledge, but is merely constitutive of the form and material contents of laboratory discourses, actions, instruments and findings that are bound up with specific historical and cultural ways of life (Latour, 1987:230; Kaposy, 2002:36; Murphy, 1994:198; Lynch and Bogen, 1997:482).

<sup>203</sup> As an approach to knowledge, postmodernism suggests the following characteristics of the modernist worldview: An overconfidence in the rational process to improve the lot of humankind; an overconfidence in science or rational analysis as the ultimate form of knowledge; an overconfidence in progress, whether economic, social or technical - much so-called technological progress may benefit some at the expense of others who carry the cost of such progress, as experienced by

middle and lower classes of Edinburgh embraced phrenology<sup>204</sup> as a form of medical and proto-psychological inquiry that could favourably compare with the wisdom possessed by the scientifically literate, university-educated upper-class. By adopting the technique as a means of social and cultural expression, one could participate in the accumulation of esoteric forms of knowledge without the required initiation into the mysteries of science or moral philosophy. But more importantly, the overriding interests in this case were social control and legitimation: two groups struggling to impose their view of a proper social order (Law and Lodge, 1984:137-138).

This issue of legitimation was cited by some interviewees as being an increasingly frequent occurrence at society meetings when invitations to lectures were extended to the general public.<sup>205</sup> Malcolm noted that after some lectures, he was apt to be cornered by a member of the public - “not *necessarily* crazy” - and questioned at length about the validity of the material being taught:

When you get to that point when...you start to bring up *how* things work, you know...cosmology, the nuts and bolts, the theory of things like physics...people can...get *defensive*. It's challenging some of things they may...you know, hold to be...*'real'*. And you can try to explain that, the ways that stars work or some of the more challenging stuff, like how things form...and some don't like it because [they're] religious...or they think that because we talk about 'dark matter' or 'dark energy' holding together galaxies, the attitude from some is that, well, they don't get how science works, with forming a hypothesis and, empirical testing and all that...so they think “aha, well [scientists] can't *prove*” [the existence of dark matter/energy] so “*my* ideas about how it works are better, because [my ideas] have *all* the answers”...Which is just bunk, some of the stuff you hear, it's just explanations they've pulled out of thin air...it can be very frustrating.

Likewise, amateur astronomer and high school teacher Harold expressed his concern at the prevalence of ‘alternative ways of understanding the world’ that he saw among many of the parents he talked to during parent-teacher evenings: “I see it more as a general trend away from science here in New Zealand...There's not the emphasis on research or science, on teaching somebody how everything works. [A] lot of things disturb me...people are interested in pseudo-science these days, astrology, all sorts of superstitious claptrap, and this really worries me...The perception seems to be that somehow science is not people-friendly or humanistic...so instead, people want to find things that they think are going to give them all the answers.” At various points in their respective interviews, both Malcolm and Harold had suggested that New Zealanders had an almost innate “distrust of the things that scientists do,”<sup>206</sup> indicative

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increasing pollution and environmental degradation; and the belief that modern Western civilisation is superior to others (Devine, 2004:3).

<sup>204</sup> The ‘reading’ (feeling) of lumps on the human head as an indicator of personality traits and mental disposition.

<sup>205</sup> I had some direct experience of this when attending an astronomical society meeting in Nelson, when at the conclusion of the evening lecture on galaxy formation, a man seated behind me took the opportunity to summarise the failings of the theories presented. Galaxies, he informed me, formed as a result of a ‘universal energy’ that science was unable to comprehend due to its ‘spiritual nature’. When I asked *how* he knew this, he responded it was because ‘science fails at every turn’ in attempting to explain how things work. For him, this naturally proved that the causative element involved in the formation of universal phenomena had to be something ‘science couldn't see, or perceive’.

<sup>206</sup> *Malcolm*

of an anti-intellectualism born from ‘tall poppy syndrome’ and a fear that common social interests would be overridden by elitists with a monopoly on the knowledge of ‘how things work’.

The parallels with the Edinburgh case are palpable, but this also goes some way to clarifying one of the key concerns implicit in my informants responses: if socio-structural constraints exist that prevent people from accessing knowledge, people will invariably turn to other means to get it; and will, in turn, attempt to redefine the existing social order in terms that legitimate and reflect the channels through which this knowledge can be gained. Law and Lodge (1984) note for instance that “knowledge is constructed to achieve goals. The hypothesis is that all knowledge develops under the auspices of an interest in natural accounting<sup>207</sup>, prediction and control, and an interest in social control and legitimation. Further, knowledge directed primarily by an interest in natural accounting normally has social control implications. Knowledge directed by an interest in social control is typically legitimated with reference to its supposed power of natural accounting” (1984:134). This has particular relevance to the themes explored in the previous chapters, in which I discussed the concept of *moral regulation* and the tourist-driven moral distinction between nature and urban existence invoked by astronomers to assist in educating visitors. In this sense, the idea of “social order” is intrinsically bound to ideas concerning morality. The problem with the term ‘moral’ in this case is one of semantics. In its simplest definition, *morality* is a social or cultural category that encompasses ideas regarding what is ‘right’, what is ‘wrong’ and what constitutes ‘truth’ pertinent to some form of intentioned action. Science subscribes to a descriptive view of nature from which ‘truth-statements’ are derived; facts are quantifiable, exist independently of interpretation, and as ‘facts speak for themselves’ the information gleaned from nature can be used to make objective, utilitarian moral choices. To this end, the practical astronomers discussed in chapter one take it as axiomatic that contributions to scientific knowledge constitute a beneficial utilitarian moral action. Postmodernist discourse on the other hand, questions the methodological frameworks that give validity to scientific ‘facts’, and thus defines morality in subjective terms; moral decisions rest on a premise of perceived outcomes, rather than factual ones. Devine (2004:2-4) suggests that one key issue with postmodernist approaches to knowledge is that it proposes multiple realities, while paradoxically, proposes that the insights derived from discourse highlight a more fundamental reality; one that can definitively illuminate science’s failings.<sup>208</sup> Vehement critics such as Levitt (2001:44) suggests that postmodernists are unhappy with science “because science undoes both the mythology and moralism” of the postmodern stance:

The myth is that the Western world is especially mired in delusion. Since the success of science is the emblem of Western triumphalism, the devout postmodernist must find a way to label it delusory. Since science is uniquely connected to Europe, the moral errors of imperialism and capitalism must be detected

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<sup>207</sup> “Natural accounting” is a term used to describe taxonomies of natural phenomena, i.e. the statistical analysis and data collected as a result of observations.

<sup>208</sup> Devine (2004:5) suggests the broader implications of postmodernist deconstruction is that where it “provides evidence that certain beliefs suppress or devalue, the technique cannot reconstruct or offer alternatives without referring to a meta-narrative....unless postmodernist devotees admit their meta-narratives to allow dialogue, postmodernism will only survive as an ideology in an affluent society able to ignore rational, evidence-based knowledge development.”

in scientific knowledge. Since the generality of the scientific picture lays bare the unreliability of local [folk] “ways of knowing”, the very idea of “universalism” in knowledge must be disparaged.

A more equinimical concern among proponents of scientific rationalism is that if knowledge in society is incomplete, the gap between individual experience and public knowledge is liable to be filled by persuasion. And the resources available to make claims persuasive - claims that may encompass subjective interests, reactionary moral panic or political dogma - may include *any tools the local culture makes available and is responsive to* (Murphy, 1994:198; Shapin, 1995:303, 305; Morrison, 1997:184). As mentioned, the “habitual work and leisure relations” (Friedman, 1994:182; Rojek, 1985:65) of modern urban life combine to cultivate what Weber (1978:385-86 cited in Rojek, 1985:65) characterises as an endemic ‘ethic of the mean’. And it is within this environment that commercialised forms of popular mass entertainment - television, movies, the internet and other audio-visual multimedia - serve as the primary tools through which the general population receive and process information. The concern among advocates of science education is that the majority of this information lacks peer-review and is therefore prone to factual error, falsity and subjectivity. Worse still, because many individuals are likely to absorb this information unquestioningly, the social order of society risks being subjugated by scientific illiteracy that is, in part, legitimated by relativistic postmodernist discourse that denounces rational, universal truths. An informant, Daniel, noted that popular science documentaries on television, while sometimes useful, more often than not incorporated elements of pseudo- or “just plain bad” science into their features to increase its entertainment value (and thus, its commercial appeal). During an interview he mentioned a minor example from his time spent lecturing at his local society meetings:

When I used to be in the Royal Astronomical Society they used to have an education section [and] I got put on the email list, so I do get emails from teachers [asking questions about science]. You end up informing people, and dispelling myths and things. Sometimes you get people saying things like “well man never really landed on the moon”. I did a whole talk on that once, I got a videotape from a documentary that showed on TV3 [that suggested the landing was a hoax]...you can go through that whole program and critique every point they made and explain the science, and explain why this is not a hoax, why the shadows are that way, how rocket engines work, and refute every allegation that these conspiracy theorists make [because] occasionally you *do* get someone who does ask that, “do you *really* think people really landed on the moon?” And it’s...my...*job* to put them right.

This concern can also be traced to the fate of the recently refurbished Carter Observatory. In December 2006, the government announced a \$2.2 million funding package that would assist Carter Observatory to upgrade its resources and conduct a long-anticipated refit<sup>209</sup>, with the Wellington City Council providing

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<sup>209</sup> Carter staff member Geoff was hesitant about endorsing some of the proposed changes, such as the planned upgrade of the existing planetarium lens. “[The existing lens] is a beautiful lens, the optics are great...what will we do with digital? Flash graphics and presentations sure. But it’s not the same.” Others were more optimistic. “You know, [Wellington Mayor] Kerry Prendergast came up here, she was just so impressed...she looked up at Jupiter through the telescope and was just...“wow”, you know. It definitely had an impact. The decision [for the funding]...it was something to do with that. You

an additional \$3 million to the Carter Trust over a 10 year period.<sup>210</sup> The observatory, opened in 1941, originally had four distinct functions outlined in its national charter: to conduct original astronomical research, to assist in the preservation of New Zealand's astronomical heritage, to provide a national astronomy education service and to provide a national public astronomy service. By performing these functions, the observatory aimed "to raise the scientific literacy of society, and to attract young people to study science and engineering" (Orchiston & Dodd, 1995:165). As a research facility, the observatory catalogued solar observations, chromospheric flares, double stars, occultations, eclipses and comets throughout the latter half of the 20<sup>th</sup> century. With the Mt John Observatory in Lake Tekapo, Canterbury, conducting quality astronomical research with superior equipment, in the 1990's and early 21<sup>st</sup> century Carter shifted its focus from active research towards education programmes. This included evening science courses for adults, public seminars and telescope demonstrations, reflected in the amended charter of the Carter Observatory board that "Carter Observatory will provide education and learning experiences in astronomy for the public, for students and for amateur astronomers that are both authoritative and stimulating; and which excite the young to seek further involvement with science and technology."<sup>211</sup>



FIGURE 31. Carter Observatory informational pamphlet, issued approximately two months prior to closing in May 2007.

could see what she was thinking, that this could be a really good place to teach astronomy and science to the public, and have real astronomers doing the teaching."

<sup>210</sup> *The Dominion Post*, Friday, 21 December 2007

<sup>211</sup> Website URL: [http://www.carterobservatory.net/public/about\\_us.php](http://www.carterobservatory.net/public/about_us.php); last accessed 03 March 2009. Note that this website has become the property of the Wellington City Council and is now officially closed to the public. The new site is available at: <http://www.carterobservatory.org/index.html>

While the planetarium shows were conducted by Carter's full-time professional astronomy staff, from 2006 onward, many lectures given to the general public were performed by volunteers from the Wellington

Astronomical Society (WAS). Throughout 2006, Carter Observatory and WAS had, in the wake of a recently aborted affiliation with the Wairarapa-based Phoenix Astronomical Society, forged a reciprocal partnership based on volunteerism, public education and resource-sharing.<sup>212</sup> Members of WAS who gave up personal time to educate the public with talks and presentations<sup>213</sup> were granted access to the observatory's range of telescopes and multimedia resources. It was hoped that this partnership with a group of practical amateur astronomers would make the observatory attractive as a scientific learning centre for the general public.<sup>214</sup> However, on Friday the 21st December 2007, it was made public that seven of the observatory's nine staff, including senior astronomer Brian Carter, were now redundant - a move reflecting a complete overhaul of the observatory's original fiscal and educational direction. Nine months later, in September 2008, Carter director Sarah Rusholme trumpeted the imminent purchase of a \$500,000 "total immersion, multi-media planetarium" that would be the centrepiece of the observatory's re-opening. The new virtual-reality-style software package would allow visitors to select astronomical experiences such as flying around Mars: "a really jaw-dropping, knock-your-socks-off ride through the space neighbourhood."<sup>215</sup>

The Carter re-fit follows in the footsteps of Wellington's Te Papa Museum (1998) in bringing together a tourist-focused educational experience commonly known as "edutainment" (a portmanteau of 'education' and 'entertainment'). Edutainment is an increasingly prevalent style of teaching characterised by the extensive use of multimedia resources (films, television, software, music and internet websites) to convey learning material or complex themes in a medium readily digestible by young people, the illiterate, the uneducated, and tourists. Critics of the paradigm (for example, Stoll [1999], 2000) cite the escalating use of multimedia resources in science learning centres in the United States as indicative of a trend that places commercial interests ahead of the scientific literacy of the general public, leading people to 'seek out the

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<sup>212</sup> The shared history of the Wellington Astronomical Society, the Phoenix Astronomical Society and Carter Observatory is a tangled one, but was nonetheless a staple topic of conversation for Wellington interviewees during my research in 2007. Whenever Carter Observatory was mentioned, a story concerning people, personalities and "administrative tension" would inevitably find their way into the narrative. Informant 'Bill' summarised the situation as thus: "Phoenix, the group, actually split off from WAS back in 1999-2000...There was a separate group of astronomers who wanted to set up an observatory [and] get more active in observing, and there were some disagreements between people on the best use of resources that they had at the time, and some different ideas and so on...So, they broke off and set up their own society with the goal of setting up a research telescope...Phoenix were holding their meetings [at Carter] in 2000, and then unfortunately they left Carter on...not the best of terms. Of course seven years later they've set up Stonehenge Aotearoa, there's clubrooms up there, a shop, good facilities, so it's all sort of happened for them...WAS, they went to Carter, and set up a new relationship with them. Unfortunately science...it does tend to polarise people...there can be some quite severe conflicts."

<sup>213</sup> In early April 2007, I had the opportunity to view a lectures on the recent NASA Cassini probe mission to Titan, Saturn's largest moon. Of note in this instance was an attempt to gauge the effectiveness of Carter's advertising. Most audience members had read about the talk in the newspaper, a couple on the radio, and, to the dismay of the full-time Carter staff watching from the wings, none from the official Carter newsletter. In addition, various technical glitches, non-functioning videos and a myriad of glaring spelling errors on PowerPoint slides made many of those in attendance lose interest toward the end of the lecture, which had also began to run over its allotted 1 hour timeslot. Whether this was indicative of a 'standard' volunteer presentation is unknown.

<sup>214</sup>

<sup>215</sup> 'Jaw Dropper' at Carter. *The Dominion Post*; Tuesday, 23 September 2008



instant gratification of spectacle and sense-stimulation' over conventional teaching methods. This approach to learning was commented on by one informant, William who suggested that "[s]cience achievements aren't recognised as highly as say, economic achievements or sports achievements...New Zealand doesn't really recognise science that much in comparison. People like [making] money and to be entertained." This remark was, as it turned out, somewhat portentous in that our interview had turned to the subject of Carter Observatory's imminent refurbishment. Before the observatory closed its doors in May 2007, some local respondents had relayed to me rumours that Carter was at risk of becoming a 'bloated multiplex entertainment centre', that was more akin to going to the movies than a real educational experience. Others suggested that the investment by the Wellington City Council was, from the outset, geared toward creating a strictly tourist-oriented "bells and whistles" venture that would cut all ties with WAS and its 'quaint' volunteer-driven educational lectures in order to provide a Wellington venue capable of competing with Auckland's Stardome observatory.

This anxiety regarding to the spread of edutainment as a dominant force in public science education is based not only on how it mediates individual experiences with information, but on how this knowledge is invariably *transmutable*. That is to say, the way information is presented to the public is embedded within a framework of norms, rules, symbolism and language representative of the social structures governing those doing the teaching. Thus, the relationship to social order is best understood as a case of controlling classification. For instance, when astronomical society volunteers conduct public nights they import an existing set of classifications made by tourists involving nature, modernity and pollution, and tacitly redefine these classifications to make them conform more closely to the way 'natural symbols' (for example, sub-atomic particles, light waves or the processes that occur inside stars during their formation) are understood within their own social framework. From an anthropological perspective, structuralist accounts of classification have since Lévi-Strauss (1962) focused on processes that transgress the margin between nature and culture, whereby *nature* becomes 'culture' (for example, domestication, education and cooking) or *culture* becomes 'nature' (for instance, illness, death and war). These processes involve a multifaceted set of circumstances or specialised "arenas", in which the human body and specific persons are classified as being 'in between' normal categories of knowledge ('the healer', the 'leader', the 'teacher') and mediate the interpretation of particular ways of classifying information. Nothnagel (1996) notes that "in dealing with natural phenomena, societies do not only produce or reproduce a classification of them, they *re-establish a definition* of culture which is conceived as a fragile order based on restriction and moderation. Thus processes of transgression gain a multiple symbolic significance" (1996:260-261; my emphasis). It is not only society that influences the classification of nature; nature also serves as a means to introduce or to maintain order with respect to the classification of cultural items. In this reciprocal modelling process, metaphoric structures of reasoning are of central importance. Bloor (1982 *cited in* Shapin, 1995:303) expands on this reasoning in commenting that "the proper applications of terms like "chicken", "dog", "electron" are not logically fixed...how such terms are used, whether by scientists or laity, is adapted to a range of contingent circumstances, including the weight of custom and convention

and the purposes people may have in representing the world.” A fundamental premise of both of these observations is that the classification of ‘things’ (*nature*) reproduces that of ‘people’ (*society*). A “star” is either a photon and gamma-ray emitting ball of gas comprised of multiple complex interactions between sub-atomic particles - or it is a manifestation of Osiris, Lucifer, Rangi, Venus or whatever is seen to wield influence over the natural processes and seasonal changes that affect people.<sup>216</sup> While the latter constitutes a folk category that may be commonly accepted as a representation rather than a physical materialisation, they may nonetheless be used as a persuasive means to add significance and legitimacy to practices or traditions relevant to the ideological and social objectives of a specific interest group. Even if the goals of a specific group, such as those of the Druid community, are beneficial to astronomy - for instance, goals that focus on environmentalism or ecological activism - as these objectives are politically and spiritually motivated, they are intrinsically bound to a system of alternative classifications for natural phenomena pursuant to their own sense of identity and concept of social order. Any compromise or association with such an approach - whether directly or indirectly beneficial - implies a sacrificing of control over how natural symbols are classified in the eyes of the laity. In this sense, Murphy’s (1994:198) suggestion that the gaps in public knowledge are filled by persuasion carries with it anxiety that blending entertainment and science will lead to the re-classification of natural symbols. For if subjectivity and political interests are permitted to govern the classification of empirical phenomena, the modern scientific project becomes subject to deconstructionism, relativism and ultimately, irrelevance.

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<sup>216</sup> At present, the International Astronomical Union (IAU) is the only organisation recognised as having the authority to name stars and other celestial objects, by virtue of the object being mechanically reproduced in star maps and scientific literature, and socially reproduced by amateur and professional astronomers.

## Conclusion

The responses to the subject of Stonehenge Aotearoa provided by interviewees have, I suggest, provided an illuminating (if indirect) means to further examine some of the broader issues associated with astronomy, public education and the role of those who produce and mediate information. The ‘Henge’ itself is a striking example of man-made engineering and attention to detail; made even more impressive by the numerous unpaid hours of labour donated by volunteers passionate about the role the structure plays in assisting visitors to learn of astronomy’s complex history. Nevertheless, the presence of this manufactured monument proved to be a point of contention for many of the active ‘practicals’ who were themselves involved in some form of educational endeavour.

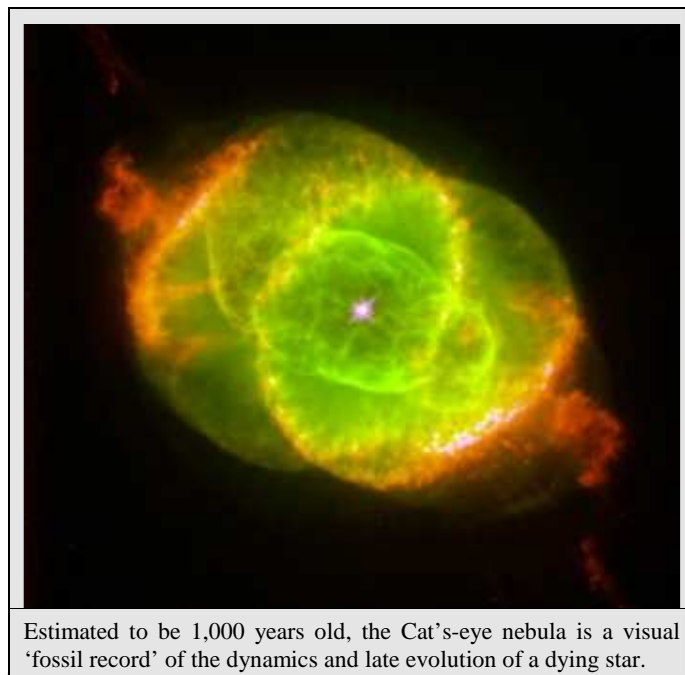
As a nod to the administrators of the Stonehenge monument on the Salisbury Plains of England, and a pre-emptive response to potential criticism, the site has formed an ongoing relationship with neopagan practitioners of archaic rituals in order to create an authentic ‘living history lesson’; one that allows the audience to disregard the inauthentic character of the structure and focus on absorbing the information conveyed by ritual spectacle. In Chapter 2, I noted that volunteers organising public viewing nights appealed to their visitors’ desire for authentic experiences and perceptions of the ‘natural’ to tacitly redefine pre-formed classifications of nature, technology and pollution and make them congruent with their own. This is perceived as rationally permissible, insofar as the process involved in redefining these associations is conducted, like moral regulation, via persuasive and demonstrative means that encourage the act of individual reflection and transformation.

To this end, the use of spectacle to engender interest among visitors is not, in of itself, necessarily frowned upon; the night sky, as a natural source of sublimity for the viewer, is commonly conceived of as ‘a spectacle to behold’. The Henge’s use of Druidic ritual and theatricality, given its designation as a venue for tourism, is arguably a straightforward case of augmenting a pre-existing natural spectacle for the purpose of adding a persuasive historical context. However, practical observers’ construction of touristic authenticity differs considerably to that of Stonehenge Aotearoa, for whom authenticity involves an affiliation with specialised interest groups that are seen to be “acting out political goals as a part of their religious experience” (Luhmann, 1993:222). In doing so, the sites position as a “multi-vocal and dynamic landscape” (Bender, 1993a:276; cited in Aitchison, MacLeod and Shaw, 2000:103) reveals itself as a space open to ideological negotiation. By blending science and a postmodern metaphysicality that embraces the relativism of knowledge, the site violates the code of contributive ethics that is morally regulated by the group to which they belong. This is, I have suggested, due to the way scientists make a categorical distinction between *society* and *nature*. Descriptive or objective claims to ‘truth’ are derived from the empirical results of observing nature; flora, fauna, ecological systems, stars, planets and other astronomical phenomena. Sociological considerations, prone to subjective bias, are seen as indicative of society, and are consequently viewed as potential pollutants of authentic science to be fervently guarded against (Kaposy,

2002:34-37; Law and Lodge, 1984:135; Shapin, 1995:297). Postmodernist discourse suggests that the meta-narratives (or claims to a 'universal' social order) implicit in scientific truths are inherently flawed, elitist and esoteric. As a result, those that argue against scientific rationalism embrace a relativistic approach, one that suggests individual communities are in possession of their own 'truths' that permit its members to speak a common language and establish a commonly accepted reality. In this sense, the favourable reception granted druids, gong masters and to a limited extent, Matariki celebrations can be seen as giving validity, and even support, to the underlying postmodernist criticism of scientific discourse. This also reconciles a fundamental theme of chapter one, in that the distinction between practical, active observers ("contributors") and armchair astronomers ("consumers") also entails distinguishing astronomical community 'insiders' from 'outsiders' (the general public). To this effect, manufacturing this distinction demonstrates how moral regulation of the internal group culminates in attempts to reproduce and maintain aspects of the internal social structure, itself representative of an idealised social order - one in which exercising control over the classification of natural symbols is an integral component.

In one respect, edutainment - the unification of 'education and entertainment' - can be seen as a logical outgrowth of postmodernist challenges to scientific rationalism. Edutainment is foremost commercially-oriented and appeals to mass consumption. And it is because of this socio-structural context in which it flourishes that it requires a transmutation of the information it presents; re-defining, contemporising and re-classifying concepts to make them easily grasped and digested by the lay public. To this end, the necessary re-classification of 'natural symbols' fundamental to the modernist scientific ethos must be renegotiated by appealing to relativism in knowledge; a stalwart test of the social order morally regulated by proponents of scientific rationalism.

## Conclusion



## *Stargazers' Anonymous*

Image credit: *NAS; Public Domain image*  
GRIN Database Number: GPN-2000-000955  
Image # : PRC95-01A  
<http://grin.hq.nasa.gov/index.html>

Astronomy has all sorts of aspects...the technical side, making telescopes, making cameras, using cameras...[T]elescopes enable us to look into deep space, star clusters, galaxies, big clouds of gas, where stars are being formed...it is that *connectivity*...this stuff is eternal, this stuff just keeps going on...we used to have a sign at our observatory that said "Danger! astronomy may endanger your sense of self-importance!"

- Ian Cooper (2007)

In the introduction to this paper I stated a simple question based on a simple observation: considering the large number of amateur astronomers in New Zealand, and the relatively healthy membership among local astronomical societies, why go to the trouble trying to educate the general public? This initial thought was based on an erroneous assumption; that the voluntary effort expended on public education could only ever be motivated by a desire to bolster the numbers of potential astronomers and ensure the survival of the community. However, as research progressed, it became increasingly clear that the real motivation was far more complex and multi-faceted than originally conceived.

For one thing, astronomy is an activity that my informants expressed great adoration for. Many spoke of 'triggers' or experiences with objects in the night sky that led them to question their own relative significance, or insignificance, in the wider universe. And in the wake of these epiphanies, most have embarked on a career of 'serious leisure' (Stebbins, 1979) or *contributive participation*, in which their marginality - derived from engaging in a leisure activity that requires the sacrifice of time for family, social life and other opportunities - extends to the very concept of leisure itself; a rejection of passive consumerism and popular leisure. In one sense then, astronomy provides a means for committed amateurs to engage in a structured network of social relationships, some of these involving collaboration with professionals, that enable them to make personal contributions to science and produce knowledge that furthers the activities in which they participate.

However, not all members within this set of structured social relationships display the same fervent level of interest. While some within this framework assist their local astronomical societies by paying their subscription fees, engaging in useful theoretical discussions and attending meetings, the description of these members as 'armchair' astronomers carries with it a categorical distinction between those that contribute to knowledge - the 'practicals' - and those that are perceived to occupy the same niche in society as passive consumers of information. While this distinction does not necessarily constitute an unfavourable or austere criticism on behalf of contributing astronomers, it nonetheless reflects an anxiety associated with broader themes concerning the ongoing accessibility of astronomy-related knowledge. To this end, it can be observed that many practical astronomers endeavour to change the social structures in which they conduct their activity; endeavours that I have suggested constitute a form of moral regulation. This type of regulation is commonly associated with state-funded attempts to change human perceptions and attitudes regarding what is considered 'virtuous' and what is considered 'deviant' - in effect, changing the *identity* of regulated individuals or groups - by encouraging activities it deems beneficial to society.

The principal weakness with these theories is that they consider the state the pre-eminent force in regulating behaviour, and thus negate the role of agency in making decisions regarding the choice of one's activity. To this end, I have suggested that following Ruonavaara (1997), moral regulation can also function within smaller groups and dense social networks in the same way as state regulation functions within the general populace. Ruonavaara's approach also reflects the Weberian concept of *Lebensführung*, or 'conduct of life', the redefining of how people view themselves in the course of everyday social relations. In addition, Giddens (1990) theory of structuration proposes that individual social action can affect structure while acknowledging the constraint structure has on agency. Individuals can reflexively recognise the effectiveness of routine actions in maintaining social order, and can reproduce that order by ongoing participation in patterned social practices (Giddens, 1984; Harvey, 1990; Kuentzel, 2000:87). These practices, I suggest, constitute a form of performance (Stebbins, 1979) in which informants morally regulate contributive participation through demonstrative actions that provide 'idealised templates of behaviour'. These involve the processes of amateur-professional collaboration, activities with informal active observing groups, and the sharing of narratives and visual references (self-referential photographs or astrophotography) with others in social settings that also include virtual online communities. More so, all of these activities require the conspicuous 'active' consumption of commodities associated with astronomy that further enhance the association of active observing with contributive participation.

On this note, one brief point left unexamined in the first chapter concerns how these attempts to deal with knowledge acquisition on one's own terms, such as the informal observing groups seeking to contribute to the astronomical sciences outside their society's official observing schedule, may inadvertently contribute to the commodification of knowledge<sup>217</sup>. By disassociating from the mainstream structure, only those individuals deemed to be 'dedicated' via their demonstrative consumption of the right materials are privy to the social networks required to participate in the active collection and production of astronomical knowledge. In this sense, knowledge becomes involuntarily "assimilated as a 'leisure good'" (Rojek, 2000:95)<sup>218</sup>, requiring the stringent maintenance of an identity congruent with the ethic being regulated. Such demonstrative contribution therefore individuates<sup>219</sup> participants by encouraging performances that

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<sup>217</sup> Indeed, if we take it as read that social interaction really is in all essence, a form of 'theatre', then certainly the 'staging' of these performances reduces the acquisition of knowledge to a formulaic form of entertainment or consumable that is digested like so much television content: designed to anticipate a response in an attempt to exploit and develop the individuated attitude and inclination of the viewer (Rojek, 1985:20).

<sup>218</sup> What Rojek (2000) refers to as "the myth of being bracketed from the dominant values of the 'straight' world of consumer culture".

<sup>219</sup> The concept of *individuation* is primarily associated with philosophical authors including Stiegler (2001), Nietzsche (1872) and Simondon (1989) and concerns the "processes which demarcate the individual as a specific person who is publicly recognised as separate and distinct from others" (Rojek, 1985:20). For instance, one's particular idiosyncrasies - name, date of birth, nationality, marital status, home address, academic qualifications and so forth - may be categorised and distilled into standardised systems of retrievable information (for example the legal requirement for a birth, marriage or vehicle warrant of fitness certificate). The relationship to leisure in this case concerns the ways in which activities are themselves standardised and differentiated, commonly found in neo-Marxist analyses of power differentiation between groups.

require “personalised, symbolic expressions of the self”;<sup>220</sup> to this end, participants must display “styles of behaviour and ownership symbolic of their presumed social level”, reflecting tastes that serve to consolidate their attachment to a specific status. What one does for leisure, with whom one associates, and one’s aims and values, are all status related, and play a major part in determining inclusion or exclusion from social groups and organisations (Kelly and Godbey, 1992:108). Although commonly utilised in the context of discussing class relations – where cars, clothes, sports and even food are symbolic of one’s status – the status element in this case is most applicable to the contributive ethic. People appraise their class position depending on how people *earn* their money, and appraise their status depending on how they *spend* it (Roberts, 2006:164). Thus, the ability to be recognisable as a ‘practical’ is dependant on an ability to consume in the appropriate manner; whether this be on telescopes and equipment, the investment of time and resources, an overt display of dedication using visual references such as photographs, or most importantly, collaborating with and contributing data to professional astronomers.<sup>221</sup> This emergent dichotomy is arguably a very ‘modern’ one; Beck’s (1994) discussion of reflexive modernisation for instance suggests that the last century has seen the consciousness of social inequality become individualised: “We began to think of ourselves as personally unequal to others, rather than subjective expressions of an objective class...[the new cultures] of leisure encourage people to think in terms of multiple identities, lifestyles and subcultures” (Beck 1994; Rojek, 2000:64). The overarching theme is simply that despite the best of intentions, leisure cannot be divorced from the context of capitalism.

It is with some irony then that the role of public education falls upon practical astronomers who, in recognition of the economically-driven framework of western tourism, appeal to the individuating characteristics that perpetuate it in order to enhance the effectiveness of the experience. Rojek (2000:149) suggests that leisure settings can be conducive to forms of transformative power that, rather than simply reproducing collective life (Durkheim, 1915; Stebbins, 1979, 1992), has the potential to challenge and overturn categories of normal identity, association and practice. In conducting public nights, practical astronomers transfer attempts to regulate and transform the immediate social structure of their own community, and utilise an existing framework of social relations intrinsic to tourism in order to redefine the attitudes, and thus identities, of visitors and their perspectives on astronomical science. As tourists seek out authentic experiences embodied in “back regions” (MacCannell, 1976:120, 123) that permit them to ‘gaze’ (Urry, 1990) upon insiders immersed in another kind of reality, public night volunteers, in encouraging hands-on demonstrations and ‘sight markers’ of extraordinary phenomena, can promote a collective feeling of shared learning among participants somewhat akin to *communitas*, in which the liminoid space of the modern leisure setting permits individuals to “stand outside the ordinary flow of

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<sup>220</sup> This idea is not a new one of course; the concept of expressing the values and idealised virtues of the self, channelled through action and ostentatious consumption, are found in early appraisals of status distinction by Weber, and are also recognisable in Bourdieu’s notion of symbolic capital.

<sup>221</sup> A Marxist view may suggest that the prerequisite to ‘act the part’ – to acquire a suitable status via performances fuelled by the consumption of goods and resources contextualised within individuated pursuits and values - contributes to a wider differentiation (and alienation) in society that “masks our shared life conditions, and also marginalises the whole questions of how these conditions are materially produced and reproduced” (Rojek, 1985:21).



collective values, axioms and conventions and [thus] objectify the order of everyday life” (Turner, 1982; 1969:137; Rojek, 2000:148-149; Fernandez, 1986:178-179). To this end, volunteers take advantage of an established touristic consciousness that perceives nature “as outside historical time and beyond the boundaries of our own cultural experience” (MacCannell, 1976:77) to ‘sacralise’ the night sky and categorically define this facet of ‘nature’ in opposition to modern life, industrialisation and urbanisation, of which light pollution is presented as a symptom. However, care is taken to ensure that technologies representative of active observing - telescopes, computers that process data and other equipment - are disassociated from industrialising processes and incorporated into the experience as objects that mediate and enhance visitor’s ability to engage with nature. Thus observatories and telescopes, in conjunction with appeals to New Zealand’s rich scientific history, come to symbolise “a collective inheritance of the natural environment” (Aitchison, MacLeod and Shaw, 2000:101; Sharpe, 2005:277; Newton and Teece, 1998:8), exploiting a touristic tendency to conflate nature with the past. In some respects, this attempt to redefine and associate technology with nature reflects the sentiments expressed by Donna Haraway (1991:163 cited in Mansfield, 2000:159) who advocates the dissolution of the ‘nature versus machine’ dichotomy that permeates postmodernist discourse:

To reject technology and seek nostalgic recourse in an idea of nature of a repressed authentic humanity is escapist. Politics can only begin in a technologised world - the present - not some distant dream of an eternal nature that we imagine will save us from the debased present...The traditional distinctions between nature and human, and human and machine, have broken down...Any space, object or body can be interfaced with any other if the proper standard or ‘code’ can be constructed for processing signals in a common language.

Thus the public space is engineered to cultivate individual transformation, in line with Urry’s (1990:8) suggestion that the tourist’s quest for authenticity is reminiscent of a ‘pilgrimage’, in which their experiences with a site, event or structure defines them as possessing the ability for a transformation of the *moral* self that persists beyond their initial encounter (Turner, 1969:166-167; 1974: 201; 1978:15). In this respect, as an innovative and transformative practice, leisure functions as an accomplishment of skilled and knowledgeable actors who can manipulate social rules as resources to achieve specific objectives. Rojek (1995:177) proposes that this observation illustrates how:

leisure relations are not relations of self-determination and freedom; they are relations of power, whose dynamics and subjective meanings reflect the historically structured economy of pleasure in society. Pleasure is not an innate drive; it is an aspect of social structure...[therefore] leisure relations must be sociologically examined as dynamic, relatively open-ended processes...Historically, trend-maintaining tendencies such as privatisation, individuation, commercialisation and pacification combine to give modern leisure its distinctive form...They project the self [and] the individual body to the fore of leisure experience.

While the social relations implicit in tourism can be exploited to communicate some underlying principles regarding attitudes to science, the medium in which this transference of ideas occurs is of fundamental importance. The establishment of Stonehenge Aotearoa as a tourist attraction, science aid and history teacher proved to be controversial for some active astronomers involved in science education, due to an ongoing relationship with neopagan ritualists that assist in creating an authentic ‘living history lesson’; one that allows the audience to disregard the ‘inauthentic’ facets of the site and focus on the lessons communicated through spectacle. However, as these interest groups are perceived to act out political goals as a part of their religious experience (Luhmann, 1993:222), the ‘Henge’ is marked as a “multi-vocal and dynamic landscape” (Bender, 1993a:276; cited in Aitchison, MacLeod and Shaw, 2000:103) open to ideological negotiation. By blending science, astronomy and metaphysicality, the site breaches a morally regulated ethic concerning the way logical empiricists compare theoretical propositions with experience. Proponents of scientific rationalism assume that theories and observational data are independent of each other, and that sense data is translatable into linguistic statements that can be compared systematically to hypotheses derived from established bodies of theory (Lynch and Bogen, 1997:482).

As scientists make a distinction between *society* and *nature*, subjective sociological considerations are viewed as potential pollutants of authentic science (Kaposy, 2002:34-37; Law and Lodge, 1984:135; Shapin, 1995:297). Postmodernist discourse argues that the meta-narratives intrinsic to scientific discourse are flawed; instead, individual communities possess their own ‘truths’ that permit members to establish a common language and reality. One of the key features of postmodernist discourse concerning the relativism in knowledge stems from sociological appraisals of the way scientists ‘construct’ truth-statements; in the postmodernist deconstruction of scientific methodology, there is no ‘neutral’ language of observation. To detect and order one’s environment, the observer imports a network as a set of preconceptions which permit them to structure sensations and make sense of what is being observed. And what a person employs to interpret and act on the world includes feelings, attitudes, information, embodied skills as well as verbal taxonomies and concepts. Because science is ‘made’ in specific sites, it is also perceived to carry the marks of these sites: the personal cognitive space of creativity, the private space of the laboratory, the physical constraints posed by natural or built geography for conditions of access, the social spaces of municipality, region or nation, or the “topical contextures” of practice and equipment (Law and Lodge, 1984:135; Barth, 2002:1; Shapin, 1995:306). As the moral regulation of astronomical community insiders is an attempt to maintain a social structure that controls the classification of natural symbols, the site is perceived as giving validity to critics of scientific rationalism that espouse relativistic knowledge integral to its concept of a proper social order.

This concern is also reflected in informants criticisms of the recent trend in entertainment-based education, or ‘edutainment’. Edutainment, as a tool of commercial interests that encourage mass consumption, operates in a socio-structural context that requires a transmutation of information (re-defining, contemporising and re-classifying) to make it palatable to the lay public. To this end, the re-classification

of ‘natural symbols’ must be renegotiated by appealing to relativism in knowledge, perceived as antithetical to the social order regulated by proponents of scientific rationalism.

In returning to my original question, “why go to the trouble trying to educate the general public?”, I would suggest that based on the observations and narratives of my informants, attempts to educate the public constitute a prosaic response to their own anxieties concerning the notion of proper social order. At an individual level, moral regulation can be viewed as part of a process Giddens (1984, 1990) describes as the creation of “ontological security”, a reliance in the ongoing practices of social structure. Giddens’ approach is entrenched in commonly held views of postmodernity (see for instance Fredric Jameson (1991); Jean-François Lyotard [1979]) that suggest a shattering of the ‘reference points of nineteenth-century and modernist humanism’ which venerated the absolute: national myths, political ideologies, aesthetic innovation and the anchoring of social life in grand traditions (Stokowski, 1994:105; Mansfield, 2000:163). Whether viewed positively or cynically, modern life is characterised by the dominance of consumer, multinational or global capitalism in which the “older theoretical models [used] to critique established systems no longer apply” (Mansfield, 2000:164). In this regard, *potential* is a recurrent theme that emerges in response to views of the modernist scientific project as inherently ‘unfixable’. While the astronomical community, and wider society, are perceived as harbouring the potential to foster behaviours indicative of passive consumption - a response to the ‘ontological anxiety’ caused by the ambiguity of modern life (Giddens, 1990; Stokowski, 1994:105; Friedman, 1994) - if subtly guided by older, rationalist models as moral projects, they also have the potential to critique the values, standards and structures in which social life is entrenched, and redefine ambiguity into constructive and progressive structures that embrace the modernist principles of scientific humanism. As a ‘conduct of life’, participation in active, practical astronomy functions as both leisure activity and socially transformative tool, though the two facets of this experience rarely, if ever, remain separate.

Organised movements by scientific rationalists in India regularly embark on projects in rural townships, providing demonstrations showing the illogicality of local myths, instigate reading classes to raise literacy, and encourage the poor to embrace technological change and scientific education in an attempt to deconstruct the caste system (Marquand, 1999:1). While the educational projects of the New Zealand astronomical community, such as promoting dark-sky initiatives, are somewhat less ambitious in scope, they nonetheless reflect a dedication to ensuring that astronomy, and the scientific ideology that supports it, remain firmly in the public eye. As informant David stated:

People [who aren’t interested in astronomy] are like people in a goldfish bowl, always looking inward, and they can’t turn 180 degrees and look outside and through the glass [at] the universe around them. I think astronomers are basically obliged to point out that there is something outside the glass, that goldfish bowl, and that’s the point... I think it’s urgent that we do.

## Epilogue

### 2009: The International Year of Astronomy

In July 2003, the International Astronomical Union (IAU) petitioned the United Nations to dedicate an exclusive, one-year period to astronomical activities and public education. After an endorsement from the United Nations Educational, Scientific and Cultural Organisation (UNESCO) and the International Council of Science (ICSU), the United Nations passed a unanimous resolution in December 2007 that 2009 would be the International Year of Astronomy (IYA2009)<sup>222</sup>. The slogan for IYA2009 was eventually announced as “The Universe, Yours to Discover.”

With one year in which to plan and execute a myriad of activities, the IAU established a central Secretariat, an IYA2009 website<sup>223</sup> as a primary information resource for the public media, and instigated the creation of numerous national nodes in countries throughout the world to facilitate collaborative networks and knowledge sharing between professional and amateur astronomers, educators and astrophysicists. As of March 2009, the global network encompasses over 137 countries, with approximately 140 expected to participate by the years end.



FIGURE 32. The IYA2009 logo and slogan as shown on <http://www.astronomy2009.org>

The primary focus however is on public education. Throughout the year-long observance of all things astrophysical, a variety of activities - the creation of educational YouTube astronomy videos, books, magazine publications, telescope seminars, star parties and observatory tours to name but a few - have been designed to bolster the validity of research conducted by amateur and professional astronomers and provide increased visibility for local societies and communities in order to attract the general public. The major events outlined for 2009 are a series of ‘Global Cornerstone Projects’, which are fully or partly funded by the IAU for the purposes of encouraging global participation in astronomical activities. Events include ‘The Galileoscope Project’<sup>224</sup>, ‘100 Hours of Astronomy’<sup>225</sup>, and the ‘Dark Skies Awareness

<sup>222</sup> The year 2009 was specifically chosen for the International Year of Astronomy as it coincides with the 400th anniversary of Galileo Galilei’s first recorded astronomical observations with a telescope, and the publication of Johannes Kepler’s *Astronomia nova* in the 17th century. Source: <http://kepler.nasa.gov/johannes/iya.html>; last accessed 28 February 2009

<sup>223</sup> <http://www.astronomy2009.org/>

<sup>224</sup> The ambitious Galileoscope Project aims to give 10 million people their first look through an astronomical telescope in 2009. According to the IYA2009 website, this is achievable if “100 000 amateur observers each show the sky to 100 people.” In addition, a worldwide Telescope Amnesty programme invites people to bring any little-used telescopes to

Program<sup>226</sup>. A series of secondary events or ‘Special Projects’ are self-funded, local initiatives that include seminars on the history of astronomy or practical telescope viewing, and are designed to be disseminated globally via online seminars and international film and documentary projects. In New Zealand, like other national nodes involved in the global network, special project activities started as early as November-December 2008, with public solar viewing in Auckland, Wellington and Dargaville. Recent events (as of March 2009) have included the annual Stardate South Island Star Party (weekend of 23 January 2009) in the Canterbury town of Staveley, and observance of the ‘Lights Out For Earth’ (5 February, 2009) local-global initiative, in which lights around New Zealand were turned off by participating astronomers and environmentally-conscious sympathisers to celebrate ‘Earth Hour’.<sup>227</sup>

It is this type of event in particular which permits one of the major themes of IYA2009 (and indeed, one of the major themes of this thesis) to become increasingly apparent: an attempt to bring about social transformation through demonstrative education and action. One of the major goals of the International Astronomical Union in promoting the IYA2009<sup>228</sup> is to “stimulate worldwide interest in astronomy and science...[and] to help the citizens of the world rediscover their place in the Universe.” As discussed in Chapter 2, local astronomical society initiatives to educate the general public on light pollution are also loaded with discerning appeals to contemporary tourists’ views of purity, nature, rural life and environmentalism. In highlighting the impact that light pollution has on “human health, ecology, safety, security, economics and energy conservation”<sup>229</sup>, and combining this with the drive of the conservation-conscious citizen, the IAU’s ‘Lights Out For Earth’ and ‘Dark Skies Awareness’ IYA2009 events aim to (hopefully) play a role in modifying behaviours beneficial to astronomy and science. But more importantly, these activities aim - like the ‘practicals’ discussed in Chapter 1 who aspire to morally regulate contributive participation among their fellow society members - to foster an appreciation of how science can reveal *new* knowledge about not just the Universe, but the terrestrial world that we inhabit.

There is however, another pertinent aspect of IYA2009’s agenda that goes beyond ‘Saving The Earth’ and sits squarely in the midst of human affairs. While a discussion of the links between tourism, environmentalism and education has, given the New Zealand ethnographic focus, been possible at a local-

IYA2009 events, where astronomers plan to teach owners how to use them and offer advice on repairs, improvements and/or replacements. *Source*: <http://www.astronomy2009.org/globalprojects/cornerstones/galileoscope/>; last accessed 28 February, 2009

<sup>225</sup> The 100 Hours of Astronomy project (2–5 April 2009) invites amateur astronomers, educators, professional astronomers, planetarium staff and science centres to arrange events around the world during the 4-day period and publicise them on the website. In addition, a 24-hour webcast from some of the largest telescopes around the world will enable a behind the scenes look at research facilities and professional astronomers at work. *Source*: [Author unknown] Feb 10, 2009; “*IYA0904: 100 Hours of Astronomy project kicks off!*”: <http://www.astronomy2009.org/news/pressreleases/detail/iya0904/>; last accessed March 01, 2009

<sup>226</sup> The focus of The Dark Skies Awareness Project is a general public-scientist collaboration programme which aims to measure local levels of light pollution. These programmes will take the form of ‘star counts’, providing people with a direct way to acquire heightened awareness about light pollution via firsthand observations of the night sky.

*Source*: <http://www.astronomy2009.org/globalprojects/cornerstones/darkskiesawareness/>; last accessed March 01, 2009

<sup>227</sup> <http://www.astronomy2009.org.nz/>

<sup>228</sup> As stated on the IYA2009 project website: <http://www.astronomy2009.org/>

<sup>229</sup> <http://www.astronomy2009.org/globalprojects/cornerstones/darkskiesawareness/>; last accessed March 01, 2009

national level, the role of astronomy-centred education in attempting to promote more ambitious projects - such as humanitarian international peace initiatives - has been outside the scope of this thesis. As an addendum to the educational declaration found on the IYA2009 website<sup>230</sup>, the International Year of Astronomy also aims to “foster a global appreciation of the role and value of science and astronomy as a unifying activity for humanity...[and] understand how scientific knowledge can contribute to a more equitable and peaceful society.” This is not however, something new. Organisations such as Astronomers Without Borders<sup>231</sup> (AWB) have existed for many years, but as national nodes of IYA2009 have been given greater visibility and license to conduct events perhaps best described as a form of low-level ‘astro-activism’. Like their environmentally-conscious, dark-skies campaigning counterparts, or the astronomical society public night volunteers that seek to engender a sense of *communitas* in their visitors, these groups also make appeals to the ‘oneness’ to be found in embracing the night sky as a facet of nature able to be shared by all who participate. The AWB mission statement (in which one can find echoes of the welcoming address by the Chosen Chief of the Order of Bards, Ovates and Druids at Stonehenge Aotearoa mentioned at the beginning of Chapter 3) proposes that: “[t]he heavens transcend political, ethnic and religious differences...The tensions of everyday life seem to drain away before the wonder and enormity of the skies, and those standing in darkness with heads turned upward never ask people beside them about their origins or beliefs. In that moment, differences are forgotten and we are one beneath the sky we share.” Following this theme, the IYA 2009 Global Special project ‘StarPeace’<sup>232</sup> was established in Iran in late 2008, with the goal of promoting communal star parties in cooperation with astronomy societies from different countries. As expected, the groups organisational statement has much in common with the goals of AWB in suggesting that astronomy provides:

a chance for all the people of the world to look at the sky again free of all political, religious, national and racial tendencies and without any differences. The sky attracted human attention from a long time ago, but humankind who have not been captured [sic] any planet except for earth, demarcated it given his differences and made a border between himself and others. Today, the sky is as adored as it was thousands years before for the people [sic]. Not only the greatness of the universe is a block against its demarcation but also its wonder gives the humankind [sic] a chance to think about the origin and destiny of the cosmos. It joins all people’s small hands to know that all are equal.

The principal activity promoted by StarPeace involves astronomical societies in two neighbouring countries orchestrating public star parties in districts around or on their respective borders (relevant to the geographical conditions of the region). In countries that have no free border (for instance, nations at war or engaged in mutual hostilities) the star party is held in a place near the shared border zone of the countries “so that people of both countries are joined by the sky.” Inhabitants of countries with free borders are

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<sup>230</sup> <http://www.astronomy2009.org/>

<sup>231</sup> <http://www.astronomerswithoutborders.org>

<sup>232</sup> <http://www.starpeace.org/En/Project/Default.aspx>

encouraged to gather together at a ‘zero-border point’, set up their telescopes, and gaze upward to “improve their connection in the sky as well as earth.”<sup>233</sup>

On the 9<sup>th</sup> of February 2009, the Sun Astronomical Society of Pakistan and the Kutch Astronomy Club of India held a combined astronomy education class and star party under the auspices of the StarPeace organisation.<sup>234</sup> The joint event, dubbed “a bridge in the sky between Pakistan and India” by Sun Society president Hassaan Ghazali, involved the synchronised visiting of SOS Children's Villages (institutions for orphaned and underprivileged children) in both India and Pakistan to conduct demonstrations of practical observing through telescopes and lectures on the solar system. As the two nations are hostile neighbours, the international exchange was conducted via telephone:



FIGURE 33. “After [the SOS event] we approached the appointed time to call our counter-parts in India. The children in Lahore all yelled “we are your friends” in unison as Mr. Narendra Sagar Gor attended the phone. Then I had the opportunity to speak to an SOS Village child in Kutch who told me she was enjoying the event thoroughly...Following the exchange of greetings, the children were showed [sic] the IYA2009 documentary which has been translated into Urdu by the IYA National Node of Pakistan.”<sup>235</sup>

At present, there are 16 StarPeace Clubs, including nodes in Iran, Serbia, India, Iraq, Nepal, United Arab Emirates, Pakistan, Indonesia and Brazil, with a number of other nations (including members of New Zealand astronomical societies) planning parallel events in support of the concept.

While 2009 was selected as the International Year of Astronomy because it fell on the 400th anniversary of Galileo Galilei’s first recorded astronomical observations with a telescope, there is little doubt - given the multitude of recorded observations available years prior to this famous event - that Galileo was surreptitiously chosen as a figurehead for IYA2009 due to his martyrdom in the name of science. Galilei’s challenging of the Catholic Church with his Copernicus-inspired heliocentric (Sun-centred) theory of the universe in 1632, his trial for heresy by the Inquisition, subsequent imprisonment and eventual death in 1642 has long stood as an example for scientific rationalists of the necessity for challenging the social and political order imposed by the state’s embracing of non-empirical, religious or ‘folk’ knowledge. Science has often been characterised by the maxim that it is ‘the disinterested search for truth.’ However, if the events of IYA2009 are any indication, the science of astronomy will continue to become an increasingly active forum for those endeavouring to enact not just social transformation, but political transformation as well.

<sup>233</sup> *ibid.*

<sup>234</sup> Source: <http://www.starpeace.org/En/Events/Default.aspx>; last accessed 02 March 2009.

<sup>235</sup> Hassaan Ghazali (2009); The Society of The Sun (Society of The Sun) Astronomical Society), Lahore, February 10, 2009. Web URL: <http://www.starpeace.org/En/Events/Pakistan/Default.aspx>; last accessed 02 March 2009.

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